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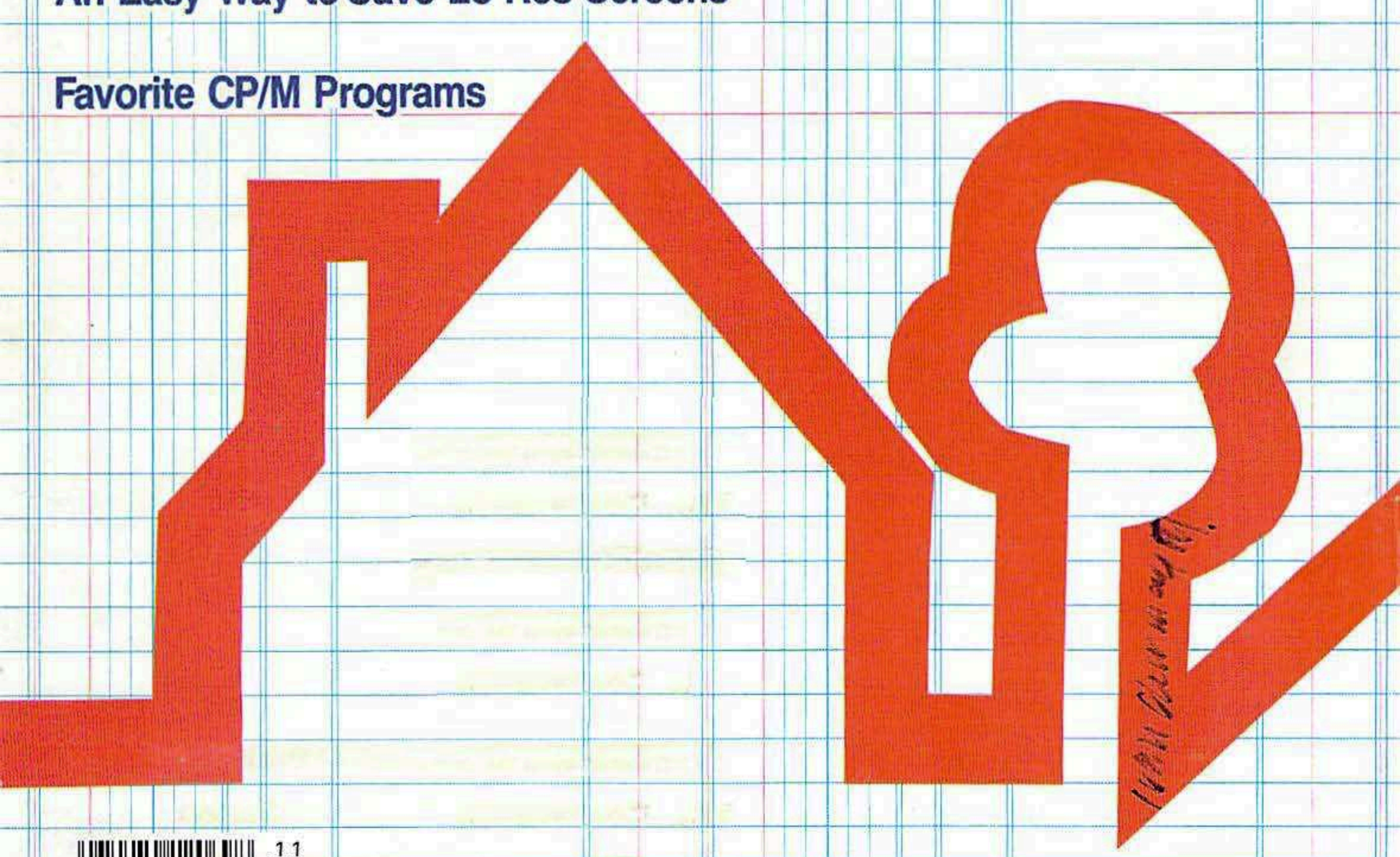

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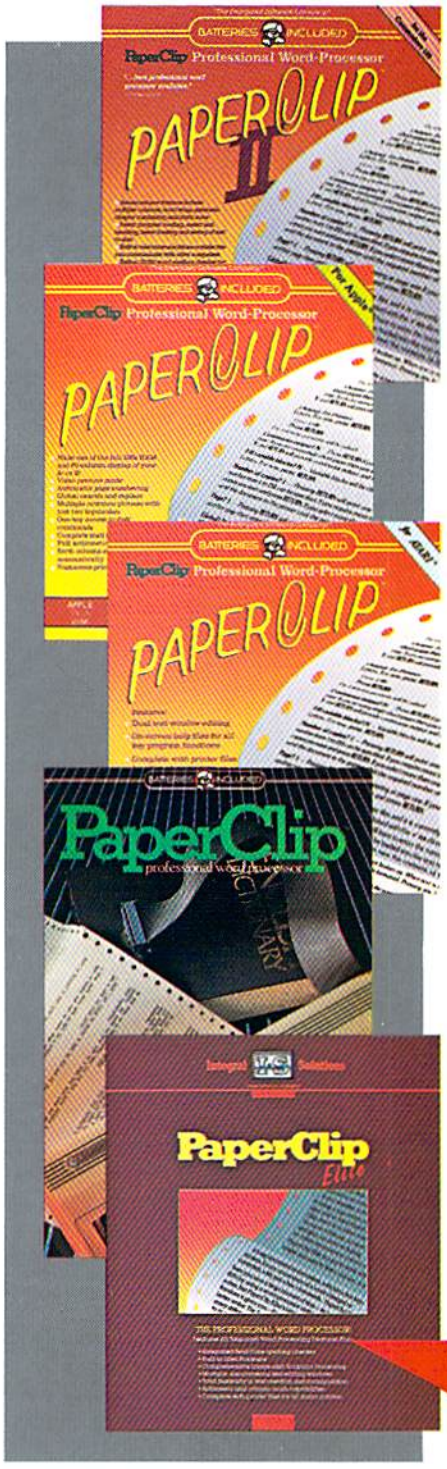

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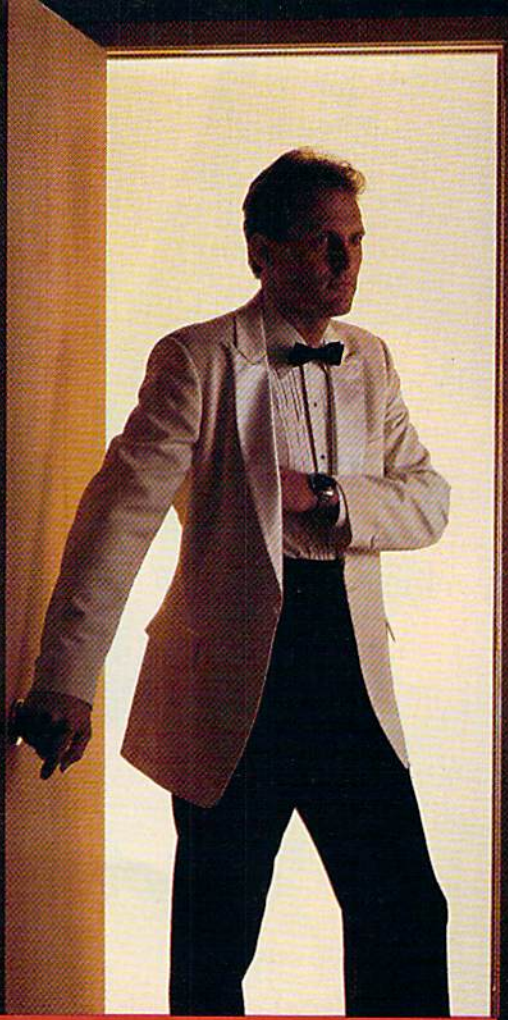

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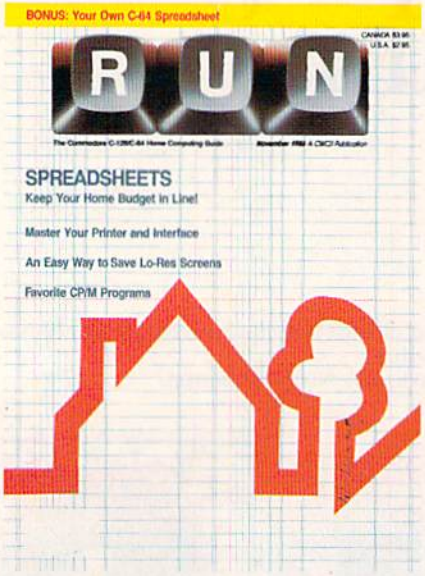
VOLUME 3, NUMBER 11

CONTENTS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An Easy Way to Save Lo-Res Screens
Favorite CP/M Programs

COVER ILLUSTRATION
BY IVAN CHERMAYEFF

FEATURES

SPREADSHEETS REVISITED *by Joseph Shaughnessy* 34
Using an electronic spreadsheet can help keep track of your finances. This first of two articles describes what spreadsheets do, how they work and the latest packages on the market.

***CALCAID 64** *by Trent Busch* 40
Boost your finances twice with our type-in spreadsheet program. It'll help you organize your budget, and you don't have to pay for it!

A CP/M SAMPLER *by Robert Rockefeller* 46
A look at a Pascal compiler, an adventure, some utilities and a telecommunications program—all examples of the vast store of public domain CP/M software that's available.

CONTROLLING YOUR PRINTER *by Joseph Shaughnessy* 54
Access the full capability of your printer and interface.

***PUT IT ON PAPER** *by Mark Rasmussen* 68
Keep a permanent record of important text and lo-res screens with this relocatable screen-dump program.

***DASHING OFF THE DOTS** *by Joe Novak* 74
Learn Morse code as a challenging pastime or as a step toward an amateur radio license.

***MATH SQUARE-OFF** *by Michael Broussard* 82
Sharpen your wits and your math skills as you play Math Scramble.

***MICRO ARTIST** *by Douglas Gannon* 90
Exercise your imagination by drawing hi-res graphics with a joystick on your C-128, C-16 or Plus/4.

DEPARTMENTS

RUNNING RUMINATIONS 8
Random thoughts from *RUN*'s editor-in-chief.

MAGIC *by Jim Borden* 10
The original column of hints and tips for performing computing wizardry.

***MEGA-MAGIC** *by Joseph Shaughnessy* 14
Tips and techniques that are bigger than Magic. This month: a fast-loader for C-64 programs on a C-128 with a 1571 disk drive.

SOFTWARE GALLERY 20
Reviews of:

- Whole Brain Spelling
- AcroJet
- Quake Minus One
- Color Mail
- Intrigue!
- Lords of Conquest
- Final Four College Basketball
- Battle of Antietam
- dfile 128

***BASICALLY SPEAKING** *by Scott M. Huse and William D. Taylor* 98
An exploration of Basic programming fundamentals. This month: the AND and OR operators.

TELECOMPUTING WORKSHOP *by David Bradley* 102
Advice and answers to your questions on modems, terminal programs, bulletin boards and more.

Q-LINK HAPPENINGS 103
Announcing the latest services on QuantumLink.

THE RESOURCE CENTER *by Margaret Morabito* 104
A school district in Michigan is serving nine schools with a mobile computer lab.

COMMODORE CLINIC *by Jim Strasma* 120
Got a problem or question related to Commodore computing? This monthly column provides the answers.

HARDWARE GALLERY 124
Reviews of:

- The Gemini II and NL-10 Printers
- MicroFlyte Joystick

CHECKSUMS FOR 1985 PROGRAMS 128
We cover April programs this month.

MAIL RUN 132

NEW PRODUCTS RUNDOWN 134

HOW TO TYPE IN LISTINGS 138

RUN AMOK 142
We run corrected.

LIST OF ADVERTISERS 144

COMING ATTRACTIONS 144

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RUN (ISSN 0741-4285) is an independent journal not connected with Commodore Business Machines, Inc. *RUN* is published monthly by CW Communications/Peterborough, Inc., 80 Elm St., Peterborough, NH 03458. U.S. subscription rates $19.97, one year; $29.97, two years; $41.97, three years. Canada and Mexico $22.97, one year, U.S. funds drawn on U.S. bank. Foreign $39.97, one year, U.S. funds drawn on U.S. bank. Foreign air mail subscriptions—please inquire. Second class postage paid at Peterborough, NH, and at additional mailing offices. (Canadian second class mail registration number 9565.) Phone: 603 924-9471. Entire contents copyright 1986 by CW Communications/Peterborough, Inc. No part of this publication may be printed or otherwise reproduced without written permission from the publisher. Programs published in this magazine are for the personal use of the reader; they may not be copied or distributed. **Postmaster**: send address changes to *RUN*, Subscription Services, PO Box 954, Farmingdale, NY 11737. (Send Canadian changes of address to *RUN*, PO Box 1051, Fort Erie, Ontario, Canada L2A 5N8.) Nationally distributed by International Circulation Distributors. *RUN* makes every effort to assure the accuracy of articles, listings and circuits published in the magazine. *RUN* assumes no responsibility for damages due to errors or omissions.

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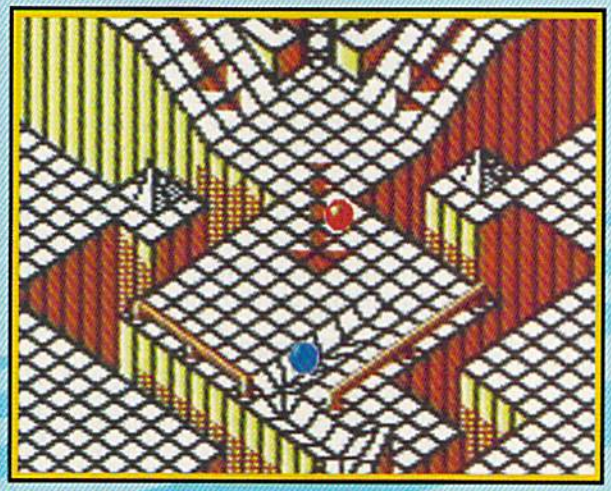

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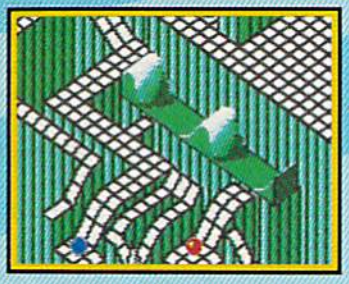

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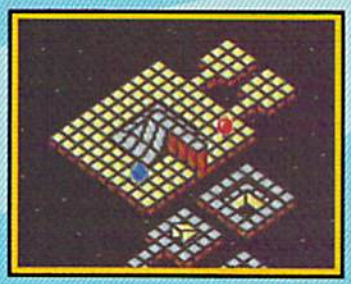

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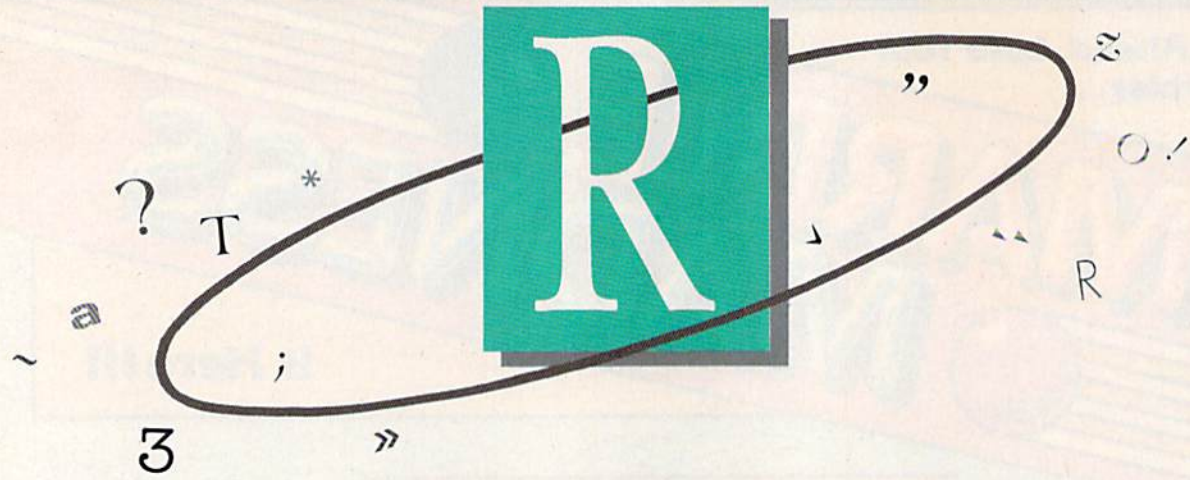

Some random thoughts before *RUN* goes to press:

Profitable Period For Commodore

We raise our joysticks in salute to Commodore for turning in their recent profitable quarter—their first after five consecutive unsuccessful attempts. Through a lot of fat-trimming and holding the line on expenses, Commodore has dramatically improved its situation.

The company now faces the unenviable task of remaining profitable, while, at the same time, beefing up its services, which have suffered during this cutback period. Several operations have been eliminated, and the work force has been substantially reduced.

Interestingly, Commodore's CEO, Tom Rattigan, was quoted in *Business Week* as saying, "Any idiot can cut. The real issue is to rebuild the company at the same time."

Rattigan is obviously aware that this is a critical time for Commodore. During the pre-holiday selling season, competition is heating up, and Commodore must remain sharp to maintain its top position in the low-end home computer market.

Although analysts agree that the company's turnaround efforts seem to be succeeding, no one is saying that Commodore is home free; but at least the company has gained some breathing room. Now, maybe, the critics will be silenced for a while, and Commodore can concentrate its efforts on getting back to basics.

Christmas Wish List

Three things I wish for Commodore this holiday season: more ads, including a TV campaign; better customer service; and a more aggressive marketing approach, particularly in the educational field.

To a certain extent, this last wish is coming true with the recently announced agreement between MECC, a reputable name in the educational market, and Commodore. Commodore will now be bundling MECC software with the 64C computer and will be distributing other MECC titles.

According to North America general manager, Nigel Shepherd, this arrangement will "bring valuable educational software directly into the home" and let students "practice their computing skills at home."

Purchasers of the 64C will receive Odell Lake, a simulation that teaches the elementary principles of ecology and biology to young students.

Other programs in the series help youngsters improve their math, reading and spelling skills, and even introduce youngsters to the elementary principles of economics. GEOS and a QuantumLink disk also come bundled with the 64C.

Good News For the Commodore Market

You could say that it took a "Supra"-human effort to raise the Cardco name from the ashes.

We recently received word that Supra Corporation, an Oregon-based peripheral manufacturer for the Atari computers, has purchased the rights to market and manufacture the Cardco line of Commodore peripherals.

According to company president, John Wiley, Supra will carry "all the interfaces, including G-Wiz and +G as well as the Freeze Frame utility." Wiley expects that Hidden Assets and the S'More memory expander will also be added to the Supra line.

All products will carry the Supra/Cardco name and be sold in the same stores—most notably, Sears and Toys 'R Us—that carried Cardco products. According to Wiley, Supra will also service Cardco products not covered under warranty for a minimal charge.

This venture marks the second entry into the Commodore market for Supra, whose first effort involved distributing the MPP-1064 modem. According to a news release, Cardco was forced to close its doors in June when its bank called in all loans.

db

The RUNning Board

RUN invites you to contact its bulletin board (RUNning Board). In addition to up-to-date information about *RUN* and the Commodore industry, the RUNning Board now presents useful computing hints and tips, corrections and updates to published articles, user's group information, an up-to-date list of selections for ReRUN and sneak previews of upcoming articles.

The RUNning Board also features a menu format that makes it easier and faster for you to select a specific section of the bulletin board. We use a standard protocol, 300 baud, one stop-bit, no parity, full duplex and a word length of eight bits.

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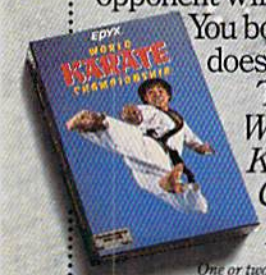

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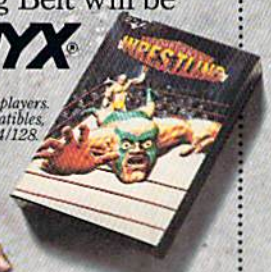

One to eight players. Apple II & compatibles, Atari ST, C64/128.

Circle 12 on Reader Service card.

By JIM BORDEN

Hints and tips for Commodore users

Magic is the original *column of reader-submitted hints and tips. Each month we present brief, useful computer "tricks" to help you get the most out of your Commodore computing system—whether you're a beginning or advanced computerist, a C-64 or C-128 owner. Magic is a forum for* RUN*'s imaginative and inventive readers to share their programming tips, brief software or hardware modifications, shortcuts or items of general interest. If you have an idea to make computing easier, faster, more exciting and enjoyable, send it to:*

Magic
RUN *Magazine*
80 Elm St.
Peterborough, NH 03458

If your trick is accepted for publication in the column, you will receive a colorful RUN *Magic T-shirt.*

$34D Cleaning heads—Here's a good way to clean disk drive heads—with a C-128! First, insert a cleaning disk into the drive and turn on the computer. Then hold down the reset switch for 30 seconds—the job's done!

Unknown contributor
Bayfield, WI

$34E How do you spell help?—Here's a short C-128 program that tells you where to turn for help.

```
1 REM REDEFINE C-128 HELP - IAN CILLAY
1Ø L=13:POKE 41Ø5,L:FOR J=4Ø96 TO 41Ø4:C=C+
   PEEK(J):NEXT
2Ø FOR R=1 TO L:READ D:POKE 41Ø5+C+R,D:NEXT

3Ø DATA 82,85,78,32,77,65,71,65,9Ø,73,78,69
   ,141
```

To restore the normal help-key definition, change the value of L in line 10 to 5 and enter the following as line 30:

```
3Ø DATA 72,69,76,8Ø,13
```

Line 10 pokes the length of the help-key string into location 4105 and calculates the location where the help-key definition begins. Line 20 reads the values of the new characters from the data in line 30 and pokes them into the proper location. End the string with a carriage return (ASCII value of 13) to execute a command, or a shifted return (ASCII value of 141) to move the cursor to the beginning of the next line.

The help-key definition can also be viewed in hexadecimal with the C-128's built-in monitor by typing M $1000.

Ian Cillay
Bethesda, MD

$34F Menu in reverse—The following routine should work on all Commodore computers. It produces a menu with reverse fields just as in some commercial programs. Use the cursor up-and-down key to move the reverse field bar, and press return to make your selection.

If you want the menu to appear somewhere other than in the upper-left corner, insert cursor movements after H$ in line 130. You have to use the same cursor movements before printing R$ on line 170. The variable A is the screen line on which the reverse field will be printed. The first line is line 0, the second line 1, and so on.

```
1Ø REM C64/C128 MENU IN REVERSE - DAVID LU
1ØØ REM * REVERSE OPTION *
11Ø REM * R$=REVERSE ON, H$=HOME *
12Ø PRINT"{SHFT CLR}":A=1:R$=CHR$(18):H$=CH
   R$(19):P1$=R$
13Ø PRINTH$P1$" OPTION 1 "
14Ø PRINTP2$" OPTION 2 "
15Ø PRINTP3$" OPTION 3 "
17Ø PRINTH$:FORI=ØTOA:PRINT:NEXT:PRINTR$
18Ø GETA$:IFA$=""THEN18Ø
19Ø REM NEXT LINE CAN CONTAIN ON-GOTO AFTER
    IF-THEN
2ØØ IFA$=CHR$(13)THENPRINT"OPTION"A"IS SELE
   CTED.":END
21Ø P1$="":P2$="":P3$=""
```

→

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Circle 168 on Reader Service card.

Listing continued.

```
22Ø IFA$=CHR$(17)THENON A GOTO24Ø,25Ø,26Ø
23Ø IFA$=CHR$(145)THENON A GOTO25Ø,26Ø,24Ø
24Ø A=2:P2$=R$:GOTO13Ø
25Ø A=3:P3$=R$:GOTO13Ø
26Ø A=1:P1$=R$:GOTO13Ø
```

David Lu
Tucson, AZ

$350 Deleting a block of lines—This tip is useful to VIC-20 and C-64 users who wish to delete a block of lines. First type POKE774,0 and press the return key. The List command lists only the line numbers. Now list the block of lines you wish to delete, move the cursor to the first line number and press return to delete each line shown.

If you wish to delete more lines than will fit on the screen, just repeat the list-and-return sequence above until all lines in the block have been deleted.

After you've finished, you must type POKE774,26 and press return to restore the normal List command.

David Pampreen
Belleville, MI

**$351 Limited input routine**—Here's a short machine language Get routine for the C-64. It provides control for you to limit the number of characters that are input. No more POKE198,0; no more GET A$:IF A$ = "" THEN . . ., and so on. Any value from 1 to 255 may be passed to the routine. The cursor will flash automatically, and the only acceptable characters are the alphanumerics, uppercase/graphics, delete and return. This means the cursor cannot move off the line you start it on by using the cursor control keys.

Experiment with the routine by positioning the cursor as you would normally do in any program, and then provide the appropriate SYS number for accessing the new routine. An example of the proper format to use the Get routine follows:

```
10 A$="":REM STRING MUST BE FIRST VARIABLE
   <Your program goes here.>
520 PRINT CHR$(147);:REM POSITION CURSOR
530 SYS 49152,16:PRINT A$
```

In line 530, the value 16 is passed to the routine, setting a maximum limit of 16 characters to input. If no value is passed, then a default of 1 is used. Be sure you define the string variable you want to use as the *first* variable in your program.

Pressing return will exit the Get routine. When you're back in the Basic program, A$ (or whatever string you defined first in your program) will hold the value that was input.

```
1Ø REM C-64 LIMITED INPUT ROUTINE - JAMES P
   ELLECHI
97 REM ALL PURPOSE 'GET' (C-64)
98 REM FORMAT:{2 SPACEs}SYS 49152,[1-255]
1ØØ FORX=49152TO49262:READZ:T=T+Z:POKEX,Z:N
    EXT:IFT<>15813THENPRINT"ERROR":STOP
1Ø1 DATA 16Ø,Ø,14Ø,111,192,132,2Ø4,177,122,
    2Ø1,44,24Ø,4
1Ø2 DATA 162,1,2Ø8,3,32,241,183,142,112,192
    ,32,228,255
1Ø3 DATA 2Ø1,Ø,24Ø,249,2Ø1,13,24Ø,53,2Ø1,2Ø
    ,2Ø8,1Ø,172
1Ø4 DATA 111,192,24Ø,236,2Ø6,111,192,16,29,
    17Ø,41,127,2Ø1
1Ø5 DATA 32,144,224,138,172,111,192,2Ø4,112
    ,192,176,215,238
1Ø6 DATA 111,192,2Ø8,5,2Ø6,111,192,48,2Ø5,1
    53,113,192,32
1Ø7 DATA 21Ø,255,169,Ø,133,212,76,23,192,16
    Ø,2,173,111
1Ø8 DATA 192,145,45,2ØØ,169,113,145,45,2ØØ,
    169,192,145,45
1Ø9 DATA 23Ø,2Ø4,169,32,76,21Ø,255
```

James Pellechi
Middle Island, NY

$352 C-128 Perfect Typist windows II—The July 1986 issue of *RUN* contained a Magic trick ($302) for using a window with the C-128 Perfect Typist program. This trick works fine if you're using an 80-column monitor. However, if the 40-column monitor is in use, the computer will return an Illegal Quantity error in line 60.

Since the C-128 Perfect Typist program already detects for 40 or 80 columns in line 25, either screen width can be handled with the following modifications.

Insert W = 39: after the A$ = "": in line 25 and add :W = 79 to the end of line 25. This change sets the correct number of columns for the Window command. Then insert WINDOW 0,4,W,24: before the SYS command in line 60. Now the window will be set to the proper width no matter which screen you are using.

Allen L. Larkins
Sandusky, OH

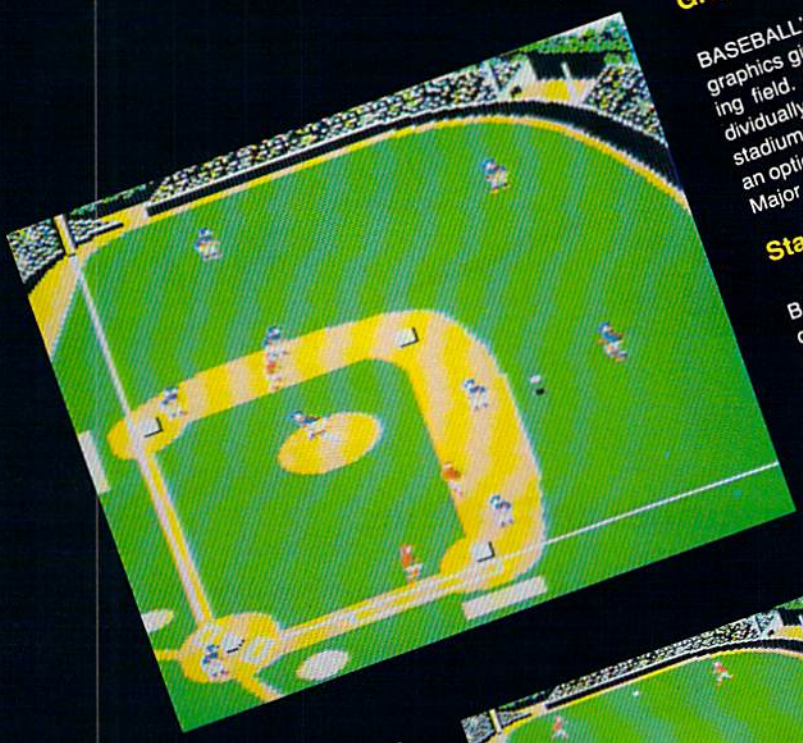
$353 A "Draw"-back in 7.0—One of the few bugs in Basic 7.0 is in the Draw command. When you attempt to draw with a negative increment such as DRAW 1,50,50 TO −20,25, you will get an Illegal Quantity error. To avoid this problem, use the RDOT function. RDOT(0) and RDOT(1) return the value of the X and Y positions of the pixel cursor, respectively. If you change the line above to DRAW 1,50,50 TO RDOT(0) − 20,RDOT(1) + 25, your program will work fine.

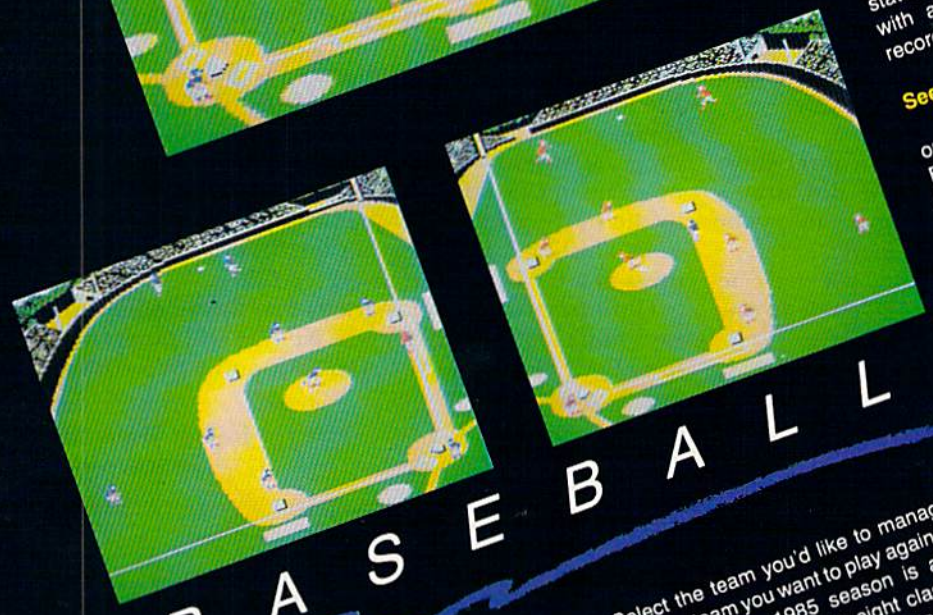
Warren Roper
Gainesville, GA

$354 C-128 customizer—If you're like me, there are several things you may change each time you start up your C-128. For example, I change the screen colors and the function key definitions. I use the following program to make all the changes I want at one time. The new function key definitions are very much like the old DOS wedge commands. You simply list the directory, move the cursor to the filename you want and press the F2 key to load or F5 to run the program. The PRG is automatically deleted from the end of the line. You can make any other changes you like.

To make the program easy to use, I put it on each new disk I format. This allows it to run with the shift-run/stop

Continued on p. 108.





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Easy-to-use subroutines and utilities

Mega-Magic, an extension of the RUN *Magic column, offers each month an interesting and useful subroutine or utility program. Although noticeably longer than those in the Magic column, these listings are still short enough to type in easily and quickly.*

Load C-128/Run C-64—This month we have three short programs that enable you to use the 1571 disk drive's fast loading speed to load a C-64 Basic program into your C-128 *in 128 mode* and then run it in C-64 mode.

To make use of any of these programs, you have to prepare your C-64 disks for loading in C-128 mode in one of the following three ways:

1. Save to your C-64 disk an autoboot-maker program, such as Autoboot Maker (*RUN*, December 1985, p. 70) or the one on the 1571 test/demo disk.

2. Save to the same disk one of the two C-128 start-up programs with this article (Listing 1 or Listing 2).

Listing 1 lists the disk directory to the screen, and instructs you to DLoad the program you want. After it's loaded, you type in either SYS 5000 to run the program in C-64 mode or SYS 5003 to list and edit the program.

Listing 2 is more automatic. You enter the filename of the C-64 program in line 10 of Listing 2 and save it to the same disk. Then, each time you load and run Listing 2 (in C-128 mode), it will load the C-64 program in 128 mode and then switch the computer into 64 mode to run it.

3. Type in, save and then run the C-128 SERMAKER program (Listing 3) to create and save a program entitled Serendipity to each disk containing C-64 programs. (You can type in SERMAKER in either 64 or 128 mode, but it will run only in 128 mode.)

Once you've prepared a disk, insert it into the 1571 and press the C-128's reset button. Your C-64 program will fast-load in 128 mode.

You can load C-64 Basic boot programs in 128 mode unless they contain an auto-run feature. In that case you must BLoad, in 128 mode, the machine language program that's loaded by the auto-run boot; then load the boot afterwards in 64 mode.

Once the 64 machine language program is BLoaded in 128 mode, you can access 64 mode by typing in the direct command GO64. Unless the boot loads more than one program when it's executed, you can BLoad the main program in 128 mode and use the SYS command, followed by the starting address of the program, to execute it in 64 mode. Listing 4 is a program for finding the starting address of a C-64 program saved on disk.

Unfortunately, C-64 programs that use an auto-run feature won't load in C-128 mode. Neither will programs that use LOAD "PROGRAM NAME",8,1 and a SYS command less than 4864 ($1300 hex).

Joseph Shaughnessy
Jacksonville, FL

Listing 1. *Start-up program.*

```
10 BLOAD"SERENDIPITY"                    :REM*232
20 DIRECTORY                             :REM*208
30 PRINT"TO AUTORUN:TYPE {CTRL 9}SYS5000{CT
   RL 0} AFTER YOU DLOAD"                :REM*232
40 PRINT"TO LIST OR RUN:TYPE {CTRL 9}SYS500
   3{CTRL 0} INSTEAD"                    :REM*140
```

Listing 2. *More automatic start-up program.*

```
5 PRINT"{SHFT CLR}{3 CRSR DNs}BLOAD"CHR$(34
  )"SERENDIPITY"CHR$(34)                 :REM*215
10 PRINT"{4 CRSR DNs}DLOAD"CHR$(34)"YOUR PR
   OGRAM"CHR$(34)                        :REM*20
15 PRINT"{4 CRSR DNs}SYS5000{HOME}"       :REM*71
20 POKE842,13:POKE843,13:POKE844,13:POKE208
   ,3                                    :REM*248
```

RUN It Right

C-128; 1571 disk drive

Listing 3. *SERMAKER program.*

```
4Ø REM FAST LOAD C64 BASIC PRGS W/ THE C128
    & 1571                                :REM*19Ø
5Ø REM JOSEPH SHAUGHNESSY 1986            :REM*15Ø
6Ø IFFRE(Ø)=FRE(1)THENPRINT"{SHFT CLR}{2 CR
   SR DNs}RUN THIS PROGRAM IN C128 MODE!":E
   ND                                     :REM*5Ø
7Ø GOSUB19Ø                               :REM*16Ø
8Ø PRINT"{2 CRSR DNs} TO SAVE {CTRL 9} SERE
   NDIPITY {CTRL Ø} TO THE DISK"          :REM*16Ø
9Ø PRINT" NOW IN YOUR DISK DRIVE (#8), PRES
   S {CTRL 9}Y{CTRL Ø}ES{CRSR DN}" :REM*248
1ØØ PRINT" IF YOU WANT TO SAVE IT TO OTHER
    DISKS,                                :REM*142
11Ø PRINT" SWAP DISKS AFTER THE BELL.{CRSR
    DN}"                                  :REM*36
12Ø PRINTTAB(9)"TO EXIT THIS ROUTINE"
                                          :REM*232
13Ø PRINTTAB(9)"PRESS ANY KEY EXCEPT 'Y'"
                                          :REM*74
14Ø GETKEY A$                             :REM*122
15Ø IF A$="Y"THEN BSAVE"@SERENDIPITY",P5ØØØ
     TO P5517:ELSE END                    :REM*124
16Ø PRINTCHR$(7):Z=Z+1:IFZ=17THENZ=1
                                          :REM*118
17Ø COLOR4,Z                              :REM*25Ø
18Ø GOTO14Ø                               :REM*174
19Ø FAST:SCNCLR                           :REM*166
2ØØ FOR X= 5ØØØ TO 5516                    :REM*88
21Ø READ A:CS=CS+A:POKEX,A                :REM*214
22Ø NEXTX:SLOW                            :REM*182
23Ø IFCS<> 528Ø7 THENPRINTCHR$(7);:PRINT"DA
   TA ERROR...CHECK LINES 25Ø-59Ø":REM*186
24Ø RETURN                                :REM*42
25Ø DATA 76,151,19,169,234,162,Ø,157,162,2Ø
   ,232,224,13,2Ø8,248                    :REM*82
26Ø DATA 173,16,18,141,Ø,192,174,17,18,16Ø,
   2Ø,2Ø2,136,192,Ø                       :REM*251
27Ø DATA 2Ø8,25Ø,142,1,192,169,2,133,25Ø,13
   3,252,169,2Ø,133,251                   :REM*141
28Ø DATA 169,192,133,253,162,Ø,16Ø,Ø,177,25
   Ø,145,252,2ØØ,2Ø8,249                  :REM*161
29Ø DATA 23Ø,251,23Ø,253,232,224,2,2Ø8,24Ø,
   169,227,133,1,169,47                   :REM*237
3ØØ DATA 133,Ø,162,8,189,228,19,149,1,2Ø2,2
   Ø8,248,142,48,2Ø8                      :REM*45
31Ø DATA 76,2,Ø,169,247,141,5,213,76,2,192,
   Ø,83,69,82                             :REM*215
32Ø DATA 69,78,68,73,8Ø,73,84,89,4Ø,67,41,4
   9,57,56,54                             :REM*213
33Ø DATA Ø,Ø,162,255,12Ø,154,216,142,22,2Ø8
   ,32,163,253,32,8Ø                      :REM*15
34Ø DATA 253,32,21,253,32,91,255,88,32,83,2
   28,32,191,227,32                       :REM*215
35Ø DATA 34,228,169,8,162,8,16Ø,15,32,186,2
   55,169,Ø,32,189                        :REM*75
36Ø DATA 255,32,192,255,162,8,32,2Ø1,255,16
   2,255,232,189,7Ø,192                   :REM*239
37Ø DATA 32,21Ø,255,224,5,2Ø8,245,76,75,192
   ,85,48,62,77,48                        :REM*221
38Ø DATA 32,231,255,169,54,133,1,169,28,133
   ,88,169,8,133,9Ø                       :REM*139
39Ø DATA 162,Ø,16Ø,Ø,134,87,134,89,177,87,1
   45,89,2ØØ,2Ø8,249                      :REM*249
4ØØ DATA 23Ø,88,23Ø,9Ø,232,224,152,2Ø8,24Ø,
   169,55,133,1,173,Ø                     :REM*31
41Ø DATA 192,133,45,133,47,133,49,173,1,192
   ,133,46,133,48,133                     :REM*151
42Ø DATA 5Ø,32,2Ø4,255,162,255,232,189,194,
   192,24Ø,6,32,21Ø,255                   :REM*77
43Ø DATA 76,141,192,32,142,166,32,51,165,32
   ,96,166,162,4,134                      :REM*249
44Ø DATA 198,189,189,192,157,118,2,2Ø2,2Ø8,
   247,88,169,Ø,133,162                   :REM*167
45Ø DATA 165,162,2Ø1,12Ø,2Ø8,25Ø,76,116,164
   ,Ø,82,85,78,13,17                      :REM*255
46Ø DATA 17,32,18,32,42,42,32,83,69,82,69,7
   8,68,73,8Ø                             :REM*11
47Ø DATA 73,84,89,32,42,42,32,146,32,86,49,
   46,49,13,17                            :REM*197
48Ø DATA 66,82,73,68,71,73,78,71,32,84,72,6
   9,32,71,65                             :REM*2Ø5
49Ø DATA 8Ø,32,45,32,49,53,55,49,32,84,79,3
   2,67,54,52                             :REM*159
5ØØ DATA 32,86,73,65,32,67,49,5Ø,56,13,17,6
   6,89,32,74                             :REM*53
51Ø DATA 79,83,69,8Ø,72,32,83,72,65,85,71,7
   2,78,69,83                             :REM*151
52Ø DATA 83,89,13,83,69,82,69,78,68,73,8Ø,7
   3,84,89,32                             :REM*34
53Ø DATA 83,79,7Ø,84,87,65,82,69,32,4Ø,67,4
   1,49,57,56                             :REM*178
54Ø DATA 54,13,17,8Ø,85,66,76,73,67,32,68,7
   9,77,65,73                             :REM*236
55Ø DATA 78,32,73,7Ø,32,65,85,84,72,79,82,3
   9,83,13,67                             :REM*17Ø
56Ø DATA 82,69,68,73,84,83,32,65,82,69,32,7
   8,79,84,32                             :REM*16
57Ø DATA 82,69,77,79,86,69,68,32,33,33,13,1
   7,67,54,52                             :REM*5Ø
58Ø DATA 32,8Ø,82,79,71,82,65,77,32,73,83,3
   2,82,69,65                             :REM*32
59Ø DATA 68,89,32,33,13,Ø,Ø               :REM*112
```

Listing 4. *SYS address-finder for ML programs on disk.*

```
1Ø INPUT"FILENAME";F$:IF F$=""THEN1Ø
                                          :REM*192
2Ø OPEN2,8,2,F$:GET#2,A$,B$               :REM*22Ø
3Ø IFA$=""THENA$=CHR$(Ø)                  :REM*25Ø
4Ø IFB$=""THENB$=CHR$(Ø)                   :REM*14
5Ø SA=ASC(A$)+ASC(B$)*256                 :REM*14Ø
6Ø PRINT"START ADDRESS = ";SA             :REM*188
7Ø CLOSE 2:END                             :REM*14
```

■

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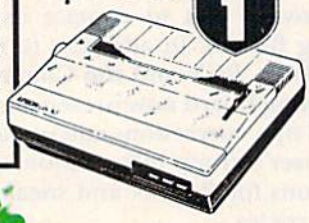

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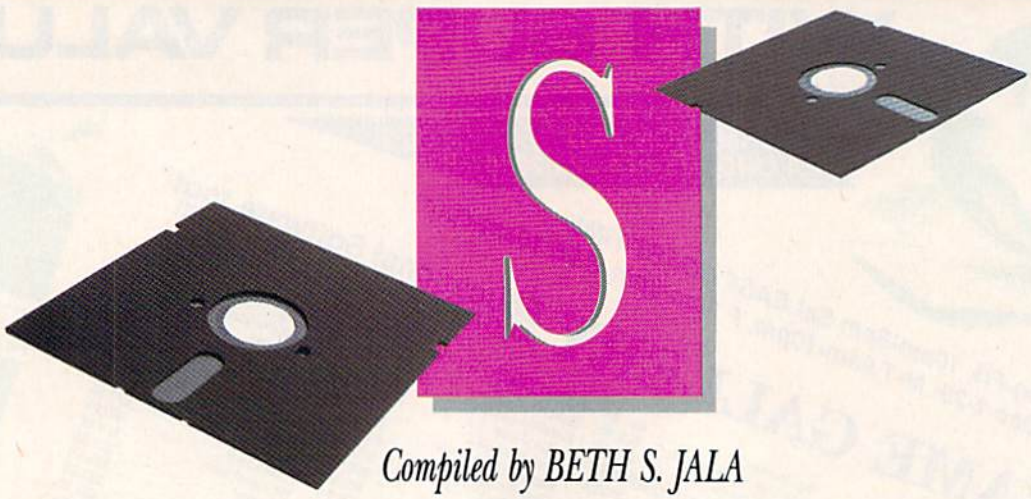

Compiled by BETH S. JALA

Whole Brain Spelling

A

Spelling Bees Leave You Tongue-Tied? Let This Program Be Your Teacher!

Educational computer software holds one of the greatest promises for the future of home computing. SubLogic Corporation's Whole Brain Spelling is an example of an excellent program that combines sound educational techniques with the advantages of computer-assisted learning. It's a series of spelling programs that can assist everyone, from preschoolers to scientists, through the use of reinforcement techniques.

Six versions of the program, sold separately, are available: A Child's Garden of Words, Fairy Tale, Scientific, Medical and Business, as well as the General Word List program I am reviewing here. The child's version is appropriate for ages five through nine, and the general program is targeted for age ten through adult.

Each version of the program contains 200 different word lists of ten words each. A 140-page instruction manual consists mainly of the listings for all of the different versions.

The program is very easy to operate. It really isn't necessary to read the instructions, although you may enjoy the material on the background of the techniques used.

Whole Brain Spelling makes extensive use of the color capabilities of the C-64, so I suggest that a color monitor be used for maximum effectiveness. The words are displayed in large, bold type, so even a color TV set can serve as a good output device for this program.

You can either select a word list to study by number or just browse through the lists. When you're spelling new words, the program does an impressive job of analyzing your errors and bringing them to your attention.

The authors of Whole Brain Spelling emphasize that spelling tests are not included. Scores are not kept because the program is intended as an aid. Parents purchasing the program for their youngsters should plan on supervising the child's use of the computer and offering additional support.

You are encouraged to use internal visualization skills to improve your spelling. Research has shown that the more senses involved in the learning process, the greater the retention level for the student.

For that reason, I was somewhat puzzled that the sound capabilities of the C-64 are not used as another reinforcement tool. Apparently, the program was also developed for the Apple and IBM machines: It's too bad that those advanced units couldn't match the Commodore's SID talents!

Interesting too, that the man responsible for the Commodore translation of the program is a musician who specializes in computer-controlled music synthesis.

Whole Brain Spelling is an excellent piece of software. It appears well suited to the task of improving spelling skills at all levels. *(SubLogic Corp., 713 Edgebrook Drive, Champaign, IL 61820. C-64/$29.95 disk.)*

Jim Grubbs
Springfield, IL

Report Card

A — ***Superb!*** An exceptional program that outshines all others.

B — ***Very Good.*** One of the better programs available in its category. A worthy addition to your software library.

C — ***Good.*** Lives up to its billing. No hassles, headaches or disappointments here.

D — ***Mediocre.*** There are some probiems with this program. There are better on the market.

E — ***Poor.*** Substandard, with many problems. Should be deepsixed!

AcroJet

A

Do Loops, Rolls And Inversions With Your C-64

AcroJet is one of the best-kept secrets in C-64 software. Released in 1985, this top-notch program is not a game in the traditional sense. It's a flight simulator that combines flawlessly animated graphics and an instantaneous response to user input. This creates a realistic feeling of flight that is second only to the real thing.

Like the BD-5J jet airplane it lets you fly, AcroJet is not designed for

IF YOU CAN FIND A BETTER C64 PROGRAM WE'LL BUY IT FOR YOU!*

These programs are GEOS COMPATIBLE

WORD WRITER with Spell Checker

- An efficient professional word processing system for home and business use.
- All the features you'll need for every day word processing, plus most of the sophisticated features found in more expensive programs: document chaining, form letter printout, page separations, horizontal and vertical scrolling, and much, much more. Plus, you get:
- An 85,000 word Spelling Checker
- A built-in, 5-function calculator.

GEOS COMPATIBLE
Documents from these programs can be incorporated into the GEOS environment.

DATA MANAGER 2 with Report Writer

- A general information storage and retrieval system with report writing, graphics, statistics, and label making capabilities. Plus, you get:
- **Quick access to important information.** Items can be easily retrieved and printed by name, index code, date range, amount range, or any category of information stored in the system.
- **Exclusive X-SEARCH, X-SORT, and X-CHART features** that allow you to cross-search any category of information; sort items alphabetically, numerically, or by date; break down statistical information into categories; and graphically view your results.

SWIFTCALC with Sideways

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- **Sideways** – Prints all your columns on one, continuous sheet . . . sideways.
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- **Performs mathematical functions,** up to 12 digits. Allows the use of minimum and maximum values, averages, sums, integers, absolute values, and exponential notation.
- **Performs financial analysis functions** calculates the present and future value of a dollar and the present and future value of a constant amount (annuity).

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** Offer expires 90 days after date of original purchase.
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†GEOS is a trademark of Berkeley Software, Inc.

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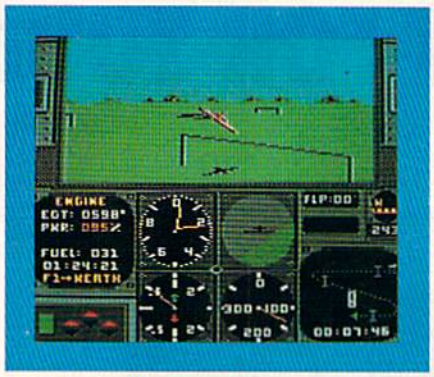


Become airborne with AcroJet.

taking casual Sunday afternoon scenic flights. Instead, you have a choice of ten competitive events, ranging from flat-out circuit racing to complex aerobatics.

You can either fly alone or compete against up to three others. Whenever a record-breaking performance is made in a particular event, the winning competitor's name and the score achieved are automatically saved to disk.

The top half of your screen consists of a view from the jet's windshield, with a perpetual moving image of your plane centered there for precise alignment. The bottom half of the screen is packed with a dozen crucial instruments.

The layout of your most frequently used flight controls is straightforward. Your joystick is the jet's control stick, and its fire-button serves as a solitary control for the rudder.

The most fascinating and entertaining aspect of AcroJet is that your BD-5J operates basically the same way most small aircraft do in the real world. There is no time lag between your action and the jet's reaction. Fly too slowly, and it will pitch up and stall; fly inverted and your controls reverse; lower your flaps completely and you'll simultaneously gain lift and lose airspeed; or bank steeply at a high rate of speed and your jet maintains altitude.

It's essential that you memorize the manual and learn how to keep your jet aloft and on course before you're ready for serious competition. Beginning AcroJet users are sure to spend countless hours attempting to complete one circuit of the basic pylon course without crashing.

Once you've become accustomed to flying the jet and have mastered the basic course, you have to perform the most dangerous and complex event in every flight—the landing. While airborne take-offs and landings are possible, you'll forfeit many points if you choose to use them.

If all this sounds a little overwhelming, I assure you that it really is. But one great benefit accompanying all this intensity is that you really learn how to fly an airplane. If the measure of a flight simulator is how well it teaches you to fly, then Acrojet could not have been better made. *(MicroProse Software, Inc., 120 Lakefront Drive, Hunt Valley, MD 21030. C-64/$34.95 disk.)*

Tim Walsh
***RUN* Staff**

Quake Minus One

Destroy or Capture Underwater Forces With Your Computer

C

It's a good story: Below the Atlantic Ocean, the Robot Liberation Front has sabotaged computers that control the Titan power station. Their further success will destroy the computers, triggering a massive earthquake that will result in the usual B-movie destruction.

After that introduction, however, things get more than a little confusing.

You are in control of the remote unit undersea tank. Your view is of the tank's control console, which contains fuel gauge, clock, weapons panel, map and keyboard.

If you haven't already been daunted by the scenario, the keyboard may do it for you. There are eight modes to the keyboard, and they will change at the twitch of a joystick, which is not always when you wish them to.

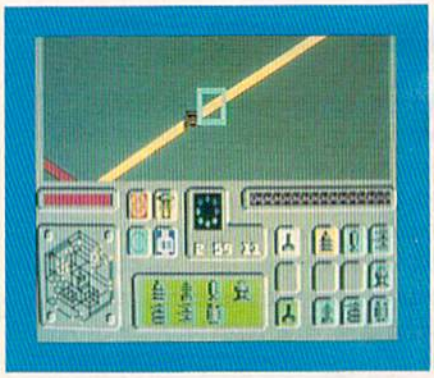
It is this multiplicity of modes that prevents you from learning the game quickly, to say nothing of mastering the moves. For example, there are seven weapons in the Weapons mode, but all will not work against all targets. The game would have been as good, perhaps even better, with fewer choices.

Moving from one option to another is not as straightforward as it should be. Before you can move from A to B, you must first access the Command mode; then to move from B to C, you must return to the Command mode.

In the game play, your object is to capture the offending computer installations. Though it is never stated—because the documentation is dedicated almost entirely to helping you wade through the control command structure—you assume the game ends when you have captured or destroyed all the renegade computers, thus preventing the killer quake.

The graphics and sound are good, though they are not reason enough to buy the game. Buy Quake Minus One only if you wish to get involved in a slow-moving, time-consuming game that leaves you with little or no reward. *(Mindscape, Inc., 3444 Dundee Road, Northbrook, IL 60062. C-64/ $19.95 disk.)*

Ervin Bobo
St. Peters, MO



Take control of your undersea tank in Quake Minus One.

Color Mail

A

Send Holiday Greetings Electronically This Season

If that old childhood joke, "What's black and white and red all over" were changed to add "...and green, orange and blue, has sound, motion and can be sent over a telephone line," the answer would be a Hallmark Color Mail electronic greeting card.

This software package comes with over 50 pages of documentation. It's lavishly illustrated and a lot of fun to read, but Color Mail is so well laid out that you may not even have to look at the instructions.

The idea is to create a full-color, electronic greeting card. Sound can also be added if you like. The program makes full use of both the high-resolution color graphics in the C-64 and the talents of the SID sound chip.

Continued on p. 26.

Introducing ActionSoft!

Colonel Jack Declares War to Improve Strategy/Action Software

Colonel Jack Rosenow, President of ActionSoft Corporation, is out to turn the simulation software industry upside down:

"Most current simulations are little more than games," says the Colonel. "They're a far cry from what can be done with modern state-of-the-art graphics technology. They have limited strategic depth and a limited sense of realism. That's why ActionSoft Corporation was created. We're going to redefine the state of the art in simulation software.

"My own area of expertise is military helicopters - their flight characteristics, and their deployment on the battlefield. We've assembled a collection of experts in other fields (combat strategists, fighter pilots, submarine commanders) to help us develop the most realistic strategy/action simulations ever seen.

"ActionSoft puts you at the center of the action. We take you from the depths of the Pacific ocean to the infinite frontiers of space. And with the incredible 3D graphics/animation technology provided by SubLOGIC, our products draw you into the simulation like never before. Up to now this type of realism has been available only on the most expensive military simulators. We're making it available to everyone.

"Our first product is Up Periscope!, a WWII fleet class submarine simulator for Commodore 64/128 and Apple II computers. Up Periscope! is available for the suggested retail price of $29.95.

"Next up is ThunderChopper, a high-performance scout/rescue/attack helicopter simulator. ThunderChopper is also available for the C64/128 and Apple II computers for $29.95."

Colonel Jack Declares War on Inflated Software Prices

"My motto has always been 'Better Quality at a Better Price'. ActionSoft simulations are generations ahead in strategy, action, and technology. And at $29.95, they're also priced less than the competition.

"Why pay more for a second-rate simulation when you can have the best for less? ActionSoft simulation software sets the new price/performance standard against which all other simulations must now be judged. But don't just take my word for it. Try ActionSoft - you'll be convinced."

Colonel Jack Rosenow, USAF (Ret)

Captain John Patten's years of US Navy experience provide the realism and submarine combat strategy of Up Periscope!

Colonel Jack's 9000-plus hours of flight time are put to good use in the development of Thunder-Chopper!

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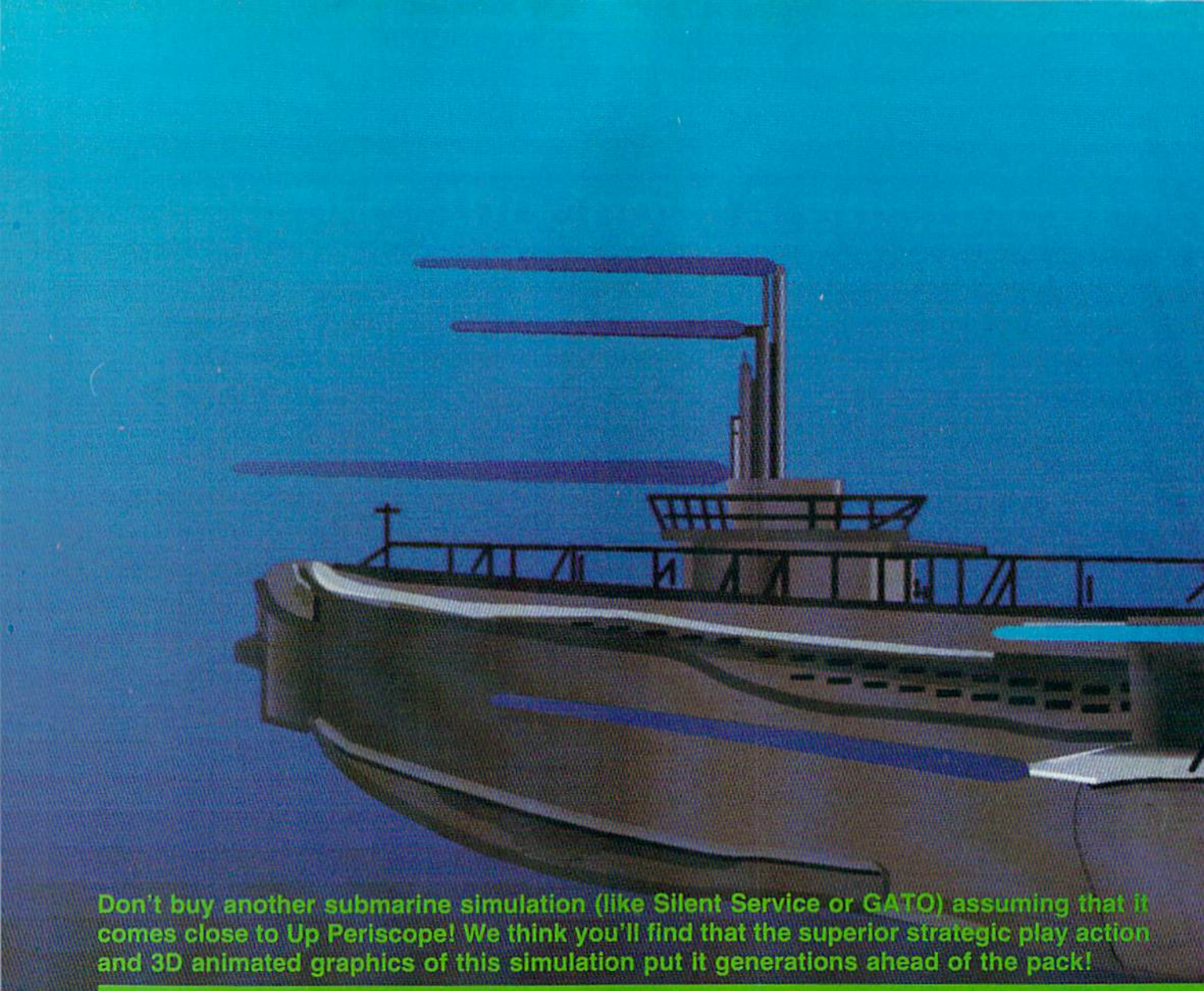


Don't buy another submarine simulation (like Silent Service or GATO) assuming that it comes close to Up Periscope! We think you'll find that the superior strategic play action and 3D animated graphics of this simulation put it generations ahead of the pack!

Strategy

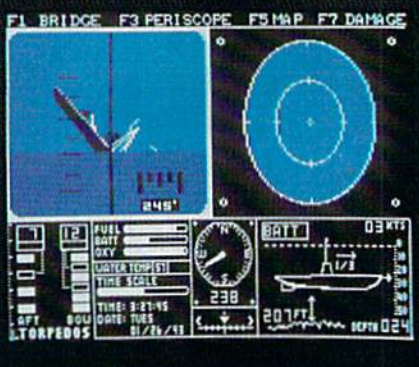
You command a WWII fleet class submarine. Patrol the Atlantic and Pacific theatres of war. Take your orders from COMSUBPAC (Commander Submarine Force Pacific), or go hunting on your own.

Captain John Patten's years of US Navy service provide the submarine combat strategy missing from other sub simulations. Successful enemy engagements are conducted in four separate phases:

1. Contact (Determine direction of target motion)
2. Approach (Close to within effective weapons range)
3. Attack (Obtain optimum firing position & avoid detection)
4. Withdraw (Avoid enemy destroyers & aircraft)

Relive eight different historical situations and compare your strategies with those of real submarine commanders. When you master the daytime periscope-depth attack, move on to the dangerous and skill-demanding night surface patrol.

Up Periscope! includes extensive realistic equipment; surface and attack radars, variable-power periscope, torpedo data computer, and much more. Armament supplies include everything from a selection of old reliable Mark 10s to advanced wakeless (but unproven) Mark 18 torpedoes that can be fired from both fore and aft torpedo tubes.



Graphics and Animation

Allied and enemy ships are depicted in truly unprecedented 3D detail, courtesy of SubLOGIC graphics and animation technology. Potential targets include enemy freighters, tankers, troop ships, destroyers, and battleships, plus various friendly forces. A complete instrument panel and split-screen views let you scan all vital information at a glance during the heat of battle.

All major land masses and islands (and even a few minor ones) are properly located. Use detailed Pacific and Atlantic charts to plot your course and navigate right to the action. But be careful not to get rammed or depth-charged by enemy ships. And try to avoid the embarrassment of sinking one of your own Allied ships or running aground on an uncharted Pacific atoll.

For true submarine action and realism, nothing else compares with Up Periscope!

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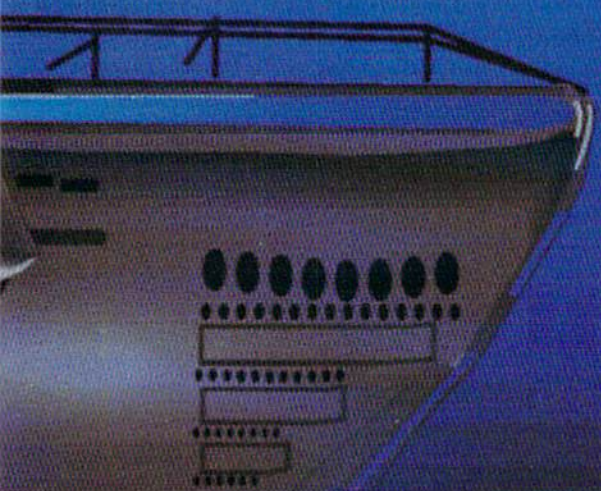
Up Periscope!

Simulation animation and 3D graphic technologies licensed from SubLOGIC



See Your Dealer...
Or write or call us for more information. Up Periscope! is available on disk for the Commodore 64/128 and Apple II computers for a suggested retail price of $29.95. For direct orders please specify which computer version you want. Include $2.00 for shipping and specify UPS or first class mail delivery. Visa, MasterCard, American Express, and Diners Club cards accepted.

Captain John Patten, USN (Ret)

- $29.95 -
Better Engineering at a Better Price

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3D Graphics and special effects courtesy SubLOGIC Corp. Electronic Boat Division

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Software Gallery

From p. 22.

During a shopping spree with your cart at your side, individual elements for your greeting are initially selected from ten libraries. Your choices include sound effects, backgrounds, characters, symbols and much more.

With your selections made, you can begin using a special editor to assemble the pieces into a card. Each item can be placed in your choice of screen positions, and the commands are included on a handy stand-up reference card.

Many of the graphics can be animated, although I found that somewhat of an optimistic term. The pictures can be made to move across the screen in accordance with a designated path; however, the motion is not fluid.

You can insert a waiting period between different elements so that the music or effect comes at an appropriate moment in the presentation.

A simple text-editing system lets you choose between two different type sizes and either black or white lettering. Your message can be placed, one line at a time, anywhere on the screen.

When all the elements are in order, you can play your greeting to see if it suits you. If it is to your liking, a menu handles the save-to-disk operations.

With your manuscript created, it's time to mail your card. Through arrangements with CompuServe, Color Mail files can be sent by uploading them to another user through the Easymail system.

Keep in mind that your intended receiver must also have the Color Mail program, or your greeting card file will be useless. Furthermore, Color Mail must be customized with your CompuServe ID, so it's not possible to use a friend's copy to view your pictures.

Color Mail maintains an on-line presence. There's a special SIG devoted to Color Mail users where you can ask questions, meet other users, enter contests and even post your birthday or other important events in your life. It's also possible to obtain, for a fee, additional graphics and sound libraries directly.

Color Mail opens up an outlet for creativity in electronic communication. Sure, you could put the disk in the mail, but sending pictures over the phone line to friends around the world is a lot more fun. After all, when you care enough to send the very best, why not send it electronically! *(Hallmark Cards, Inc., 2440 Pershing Road, Suite G-40, Kansas City, MO 64108. C-64/$30 disk + $50 PalPak.)*

Send electronic greetings with Color Mail.

Jim Grubbs
Springfield, IL

Intrigue!

A

Play It Again
And Again
And Again, Sam!

Intrigue! is perfect for those who love old movies, adventures, mysteries or puzzles. This game is modeled loosely on the spy flicks of the 40s, with a twist right out of the 80s, and it is the best text/graphics game I have encountered to date.

Intrigue! is multiplayer, but I found it to be excellent for solo play because it only takes about an hour to complete. The three levels of difficulty are a nice touch; since no two games are alike, it's not easy to get bored.

The action menus, an attractive feature of Intrigue!, make the game easier to play than most. The joystick control option allows you to play without having to be right at the computer, although keyboard input is required at times.

The object of the game is to not only find out where a genetically engineered polio virus has been hidden, but also to stop it from being used on Washington, DC.

During the course of the game, there are a number of ways to foul up your case. Pumping characters for information is a chore—especially if you say the wrong thing—because of the slow disk drive. Be sure to watch the facial expressions when you interrogate your witnesses.

Each character is a different famous movie star from the 40s, like Humphrey Bogart. They are pictured on-screen in excellent hi-res graphics.

Intrigue! has a built-in time limit. Action is taken for you if you do not move fast enough.

One interesting option is the choice of the sex of your character because responses to questions vary with gender.

Some characters can present a language barrier problem. The Little Black Book manual includes a Spanish glossary containing some of the foreign terms. You can usually get a sense of what's being said, however, by the surrounding words or sentences.

The documentation does not stress basic strategy, so you must search for everything. Although you cannot search an area with a character present, you can make most characters leave.

This is an exciting software package that can be learned quickly. I've never won a complete game, probably because I've never correctly fingered the culprits, but I have defused the bomb at the end of the easy level!

Intrigue! is also one of the most amusing games I own. The design and its ease of play are excellent for players of all levels.

I found the game challenging at times, but I enjoyed outwitting the computer. I think anyone who likes adventures or mysteries will be satisfied with Intrigue!. *(Kinemation, PO Box 3076, Peterborough, NH 03458. C-64/$39.95 disk.)*

Mike Hinshaw
Tulsa, OK

Lords of Conquest

Hungry for Power?
This Strategy Game
Should Quell the Craving

A

Electronic Arts' strategy game, Lords of Conquest, is fast; the computer whipped me soundly in about 30 minutes.

Conquer territories with Lords of Conquest.

be toggled on or off. The graphics are more than sufficient for clarity.

If the game play sounds familiar, it may be because Lords appeared a few years ago, without great success, under the name of BorderLands, distributed by Eon Software. Electronic Arts, with its greater distribution clout, has performed a rescue operation for this highly entertaining game. *(Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. C-64/$34.95 disk.)*

Ervin Bobo
St. Peters, MO

It is also a game that can be saved to disk and resumed at a later date. While Lords of Conquest invites comparisons with the board game, Risk, its speed and save features make it much more enjoyable.

In play, Lords allows single-player action against the computer, or two to four people can play as live opponents. You choose from one of four difficulty levels and then select the number of cities you must capture in order to win the game.

From there you can pick one of 20 maps to show the territories you wish to dispute, or, if none of those included really suit your drive to conquer, you can go to the edit area and design your own.

Control is through the joystick, and the moves here will remind you of the board game Othello: Good strategy is to select territories that will surround those of your opponent, while avoiding being surrounded yourself.

At the bottom of the map screen, a command box constantly apprises you of the options you have when it is your turn. You select an option by moving the joystick, and confirm your choice by pressing the fire-button.

Although the aim of the game is conquest, it's not necessary to attack at every turn. Instead, you may plan for future attacks by redistributing resources, strengthening border territories and, in multiple-player games, by trading and forming alliances. The key to success is not in simply blundering ahead with guns blazing, but in seizing the strategic initiative.

Documentation is satisfactory and includes playing tips from those who designed the game. Sound is good, consisting of musical cues that may

Final Four College Basketball

Re-create NCAA Matchups In This True-to-Life Computer Game

B

Ever wonder what would happen if Bill Walton tried to defend the "sky hook" of Kareem Abdul-Jabbar in a battle of two great John Wooden-coached UCLA Bruin teams?

How about the two Bobby Knight-led Indiana Hoosier champions facing each other right on your computer screen?

Final Four College Basketball makes these and thousands of other match-ups more than pure conjecture. Working from a solid and accurate statistical base, the teams are rated as teams and the players as individuals.

This all-text format doesn't use up all its memory with stick figure players moving up and down the court—that chore is left to your imagination. Instead, the space is devoted to cramming all the realism you could ever hope to have into an easy-to-play format.

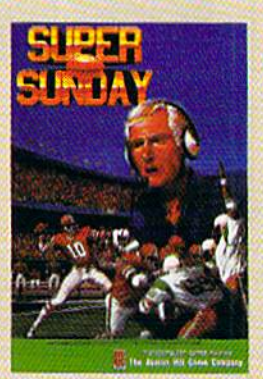
Offensively, you are the master of your own fate. You control to whom the ball is passed for about one-third of the time.

Whether your pick gets the ball in the place you'd like is a different matter. When a player receives the pass, you're given a percentage figure on his chances to hit a shot from that spot—you decide whether he takes that shot.

You pick the lineups for the teams, but watch for signs of fatigue. Get the

Continued on p. 116.

IF IT WASN'T SO GREAT WE WOULDN'T CALL IT SUPER!



Super Sunday gives you the best Pro Football teams of all time, computer analyzed to perform with proper guidance, just as they did in real life. Your brilliant play calling is re-enacted on screen by all 22 players. The additional **Champions, 1985 season** as well as the **General Manager's Disk** make this a must for all football fanatics.

For Commodore 64/128, IBM PC, PCjr and 100% compatibles. Color Graphics Board required.

Super Sunday	$35
G.M. Disk	$30
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SCIENTISTS A
DISCOVER NE

When we started our company on the west coast, people thought we were a little spaced out. So you can imagine their reactions when we announced we'd discovered a new universe.

People laughed. People scoffed. And they really freaked out when we told them where we'd found it:

Inside a Commodore 64.

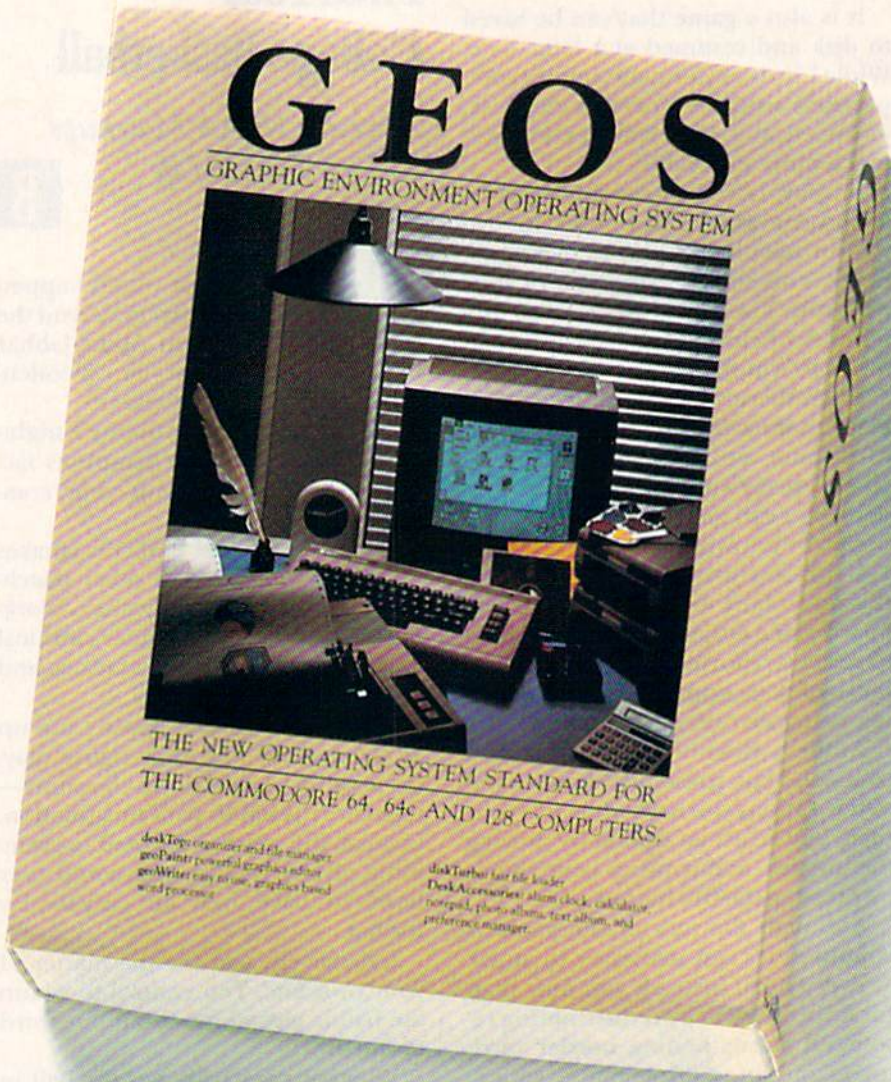
It's called GEOS. And it turns any Commodore into a powerful PC that holds its own against any computer, no matter what kind of fruit it was named after.

GEOS: The superior intelligence. Of course, we always knew Commodores possessed superior brains. It just took GEOS to discover them.

You see, GEOS opens your Commodore to a huge universe that can hold an infinite number of applications. Which means that GEOS can do just about anything the expensive PC's can do, including one thing they can't:

Add even more GEOS applications that are being developed even as you read this.

Increase your speed to warp factor 7. The first thing you notice with GEOS is how its diskTurbo speeds up your Commodore's disk loading and storing time.


GEOS
GRAPHIC ENVIRONMENT OPERATING SYSTEM
THE NEW OPERATING SYSTEM STANDARD FOR
THE COMMODORE 64, 64c AND 128 COMPUTERS.

Not twice or three times as fast. But five to seven times faster than normal. Which lets you streak through files and documents at what seems like warp speed.

And that saves you endless time.

Every universe comes complete with a desk. The way to keep order in our universe is with the GEOS Desktop. It's just like your desk at home, only without the coffee stains.

The Desktop keeps your art and documents filed, and comes

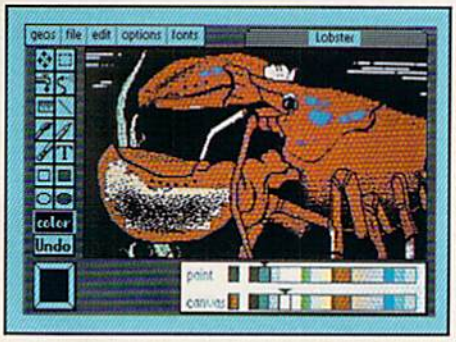
AT BERKELEY W UNIVERSE.

with all the accessories you need to keep you organized:

An alarm clock keeps you punctual. A notepad keeps your memos. And a calculator keeps your accountant honest.

How to communicate with a new universe. With geoWrite, you can rearrange your written words. Move blocks of copy. Cut and paste. And even display your text in fonts of different styles and sizes, right on the screen.

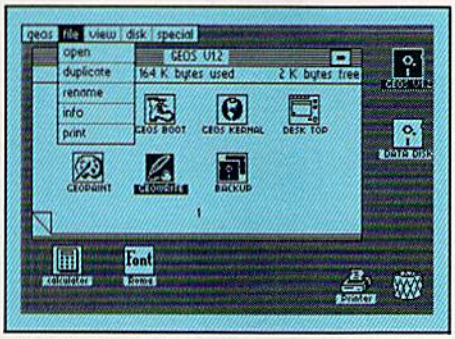
With geoPaint, you become a Michelangelo with a mouse.



Sketching and painting with all kinds of colors, textures and patterns.

You can invert, mirror and rotate images. Insert them into your geoWrite documents. And save them in your GEOS Photo Album for use later.

Finding your way through the universe. The most difficult



thing about a new universe is finding your way around. But with GEOS, you only need to remember two things:

Point and click.

When GEOS offers you options, you just point to your answers and click your mouse or joystick.

You want to draw? Point and click.

You want to write? Point and click.

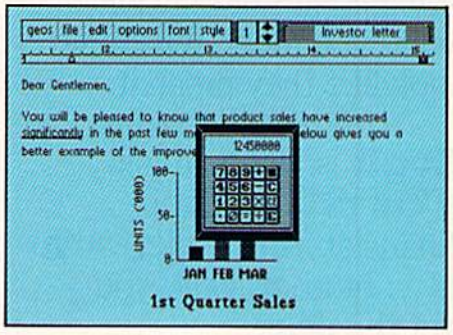
You want to fill in that obtuse rhomboid with an air-brushed geometric pattern in a lighter shade of pink? Point and click.

Easy, huh? And in case you ever do make a mistake, GEOS backs you up with an "Undo" feature that undoes the very last command you entered.

Running out of space. With GEOS, that's hardly likely. Because there's endless space in the universe for new applications.

Unfortunately, there's only so much space in this ad.

So zip down to your nearest software dealer. Tell him you want to explore the new universe in your Commodore.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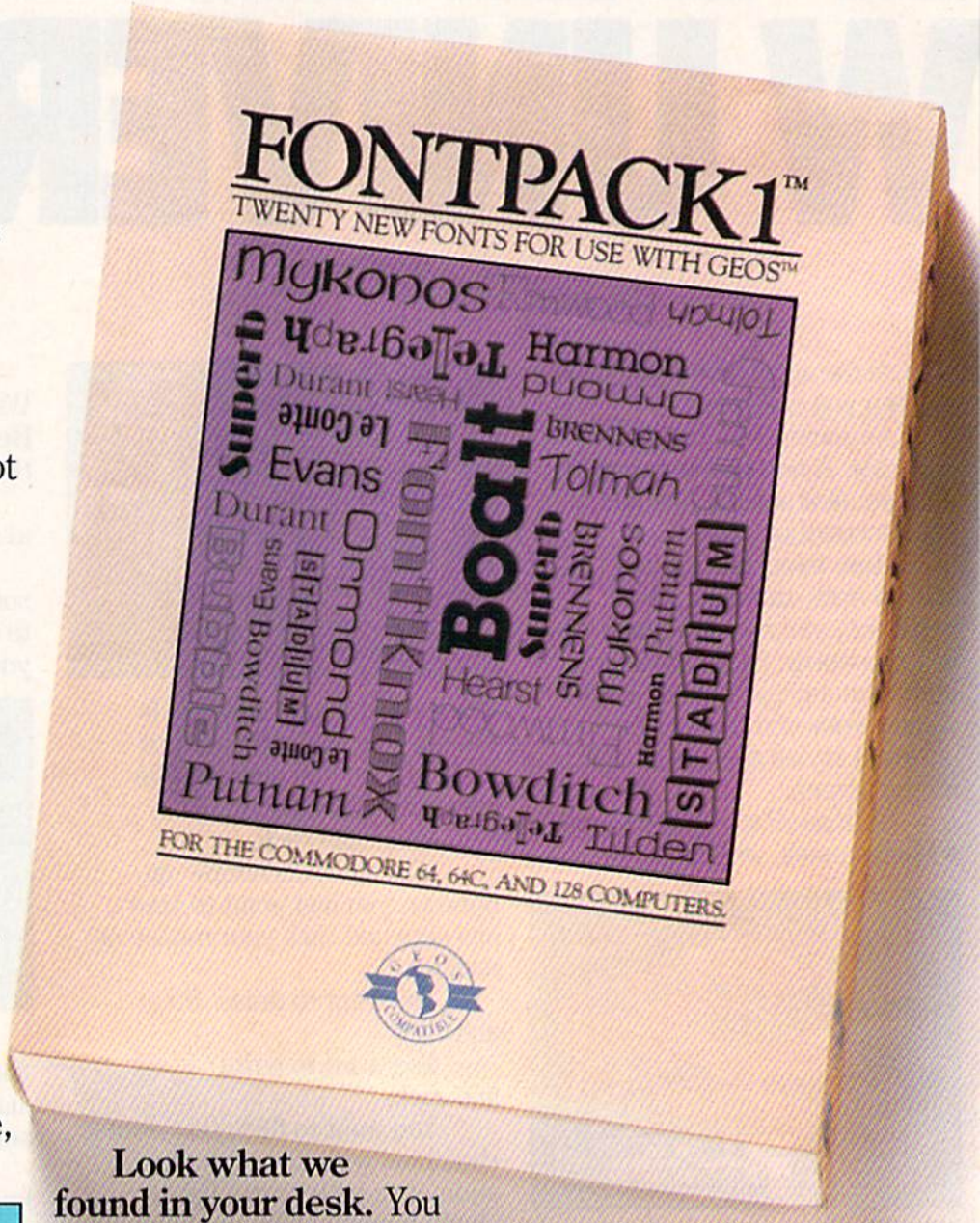

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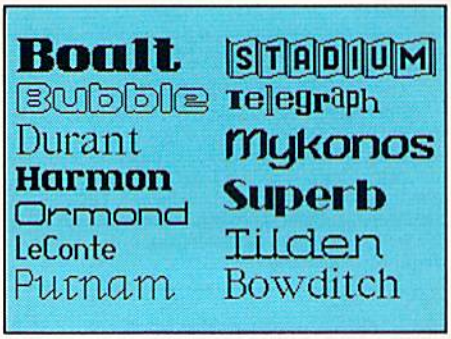

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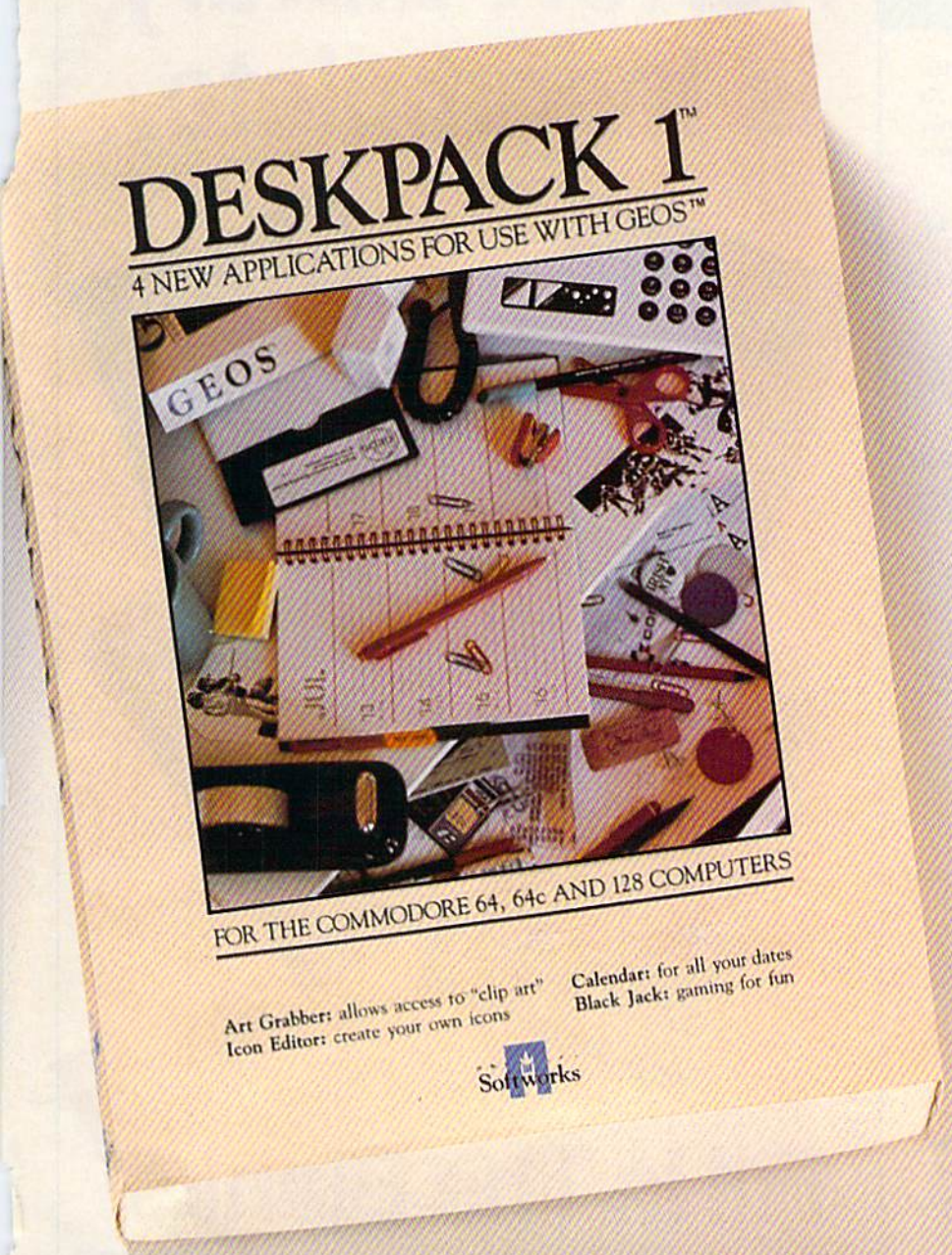
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Black Jack: gaming for fun
Softworks

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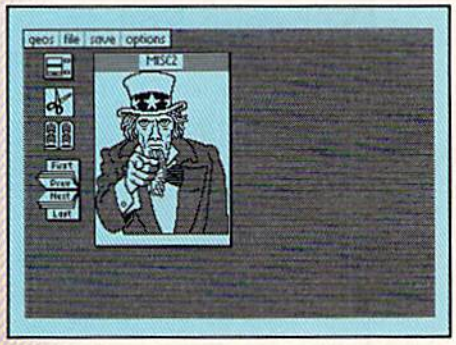

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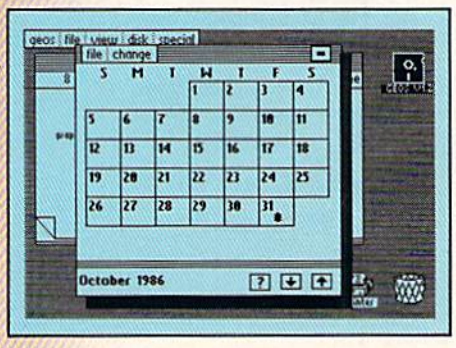

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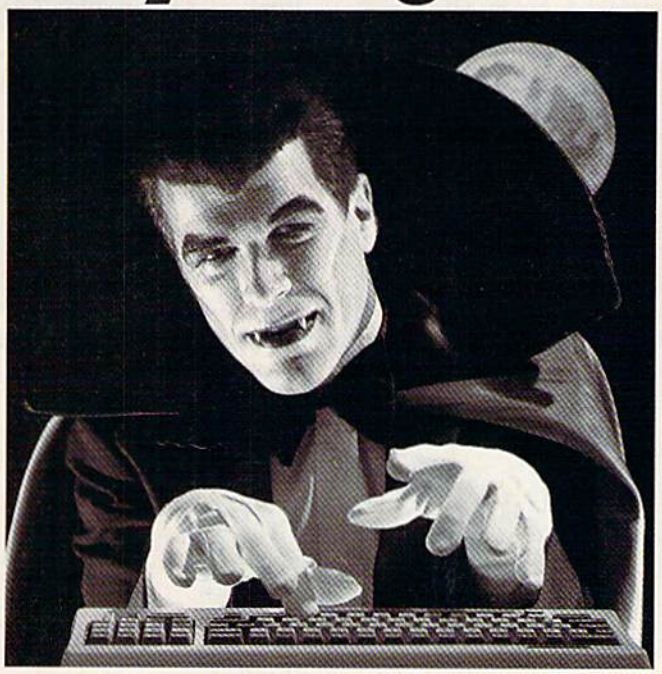

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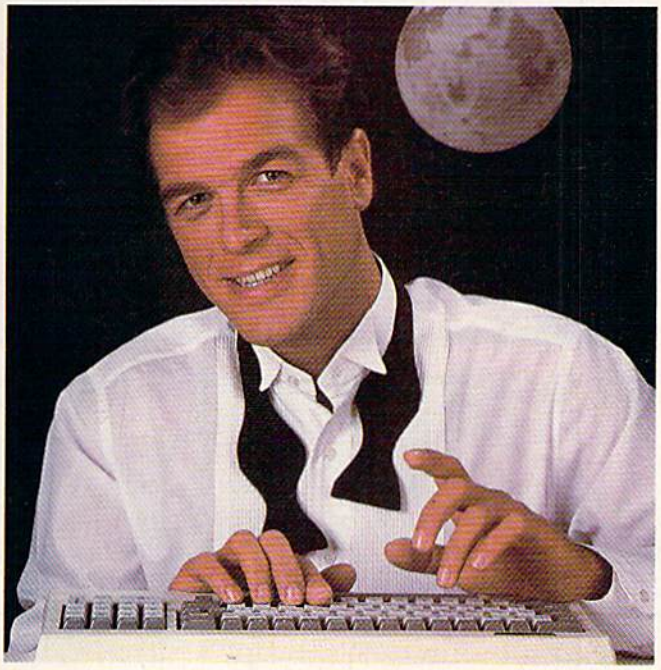

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Here's a look at what electronic spreadsheets are and what they can do for you, with a list of some of the best for you to choose from.

By JOSEPH J. SHAUGHNESSY

Almost three years ago, in its March 1984 issue, *RUN* published an article I wrote entitled "Spreadsheets... So, What's the Bottom Line?" Since that time, *RUN* has added new readers, Commodore has released new computers, with more people buying them, and spreadsheet programs with added power and flexibility have come on the market. So, it's time to talk about spreadsheets again.

In this first of two articles, I'll describe what spreadsheets are and what they're used for. Accompanying the article are a table outlining spreadsheet features and a list of commercially available spreadsheet programs. Next month, I'll present an application template for use with your own spreadsheet.

Spreadsheets are actually nothing new. There are clay tablets from Babylonian and Egyptian times that can be classified as spreadsheets, and, of course, spreadsheets have been done laboriously with paper and pencil for years. Now they come in electronic form.

Everyone who's had a computer for more than a few weeks has heard of electronic spreadsheets, but to many they remain a mystery, something of concern only to businessmen and scientists. However, just about anyone can find a spreadsheet program useful.

A spreadsheet operates on a template, a matrix of rows and columns whose intersections are called cells. Each cell holds numbers, text or a formula that relates or operates on the contents of other cells. You read the spreadsheet from left to right and top to bottom. The last column and bottom row usually contain totals or summations of the information in the other columns and rows, and any changes you make in the spreadsheet show up there.

If a cell holds a formula, what you actually see on your display is the value that results from that formula's calculations, unless you type in a command to view the formula itself.

Formulas can be quite complex. A typical one might occupy cell B10 (at the intersection of row B, column 10) and read (A5 + A6 + A9)*B6/27. This formula would

add the values in cells A5, A6 and A9, multiply their sum by the value in cell B6, divide that product by 27 and place the final result in cell B10. Imagine a whole sheet filled with these interdependent cells. A change in one value can ramify throughout.

Householders and businesspeople often use this "ripple" effect to ask "what-if" questions about their financial situations. For instance, if you were planning to buy a house, you could use a home-budget template to predict how big a mortgage payment you could add to your expenses. You'd enter various possible payments into the template; then the spreadsheet program would calculate the impact of each on your budget. Before personal computers came along, this kind of exercise used up eons of time and oodles of erasers.

Spreadsheets can be quite large. Typically, they provide more cells than there is memory in the computer to handle them. The number of cells you can actually use depends on the length of the text and formulas in the cells. Most programs give you a way to see how much memory you have remaining at any time.

A typical commercial-quality spreadsheet for the C-64 has space for 64 columns and 255 rows—that is, over 16,000 cells. Probably only 5 to 10 percent of those are usable at any one time. Naturally, with a C-128 you can fill more cells, and larger-capacity spreadsheets should soon appear that take advantage of Commodore's new RAM expanders for both the 64 and 128.

You view and manipulate a spreadsheet through a window in the video display that lets you see only a small part of it at one time. The C-128 provides a window of 80 columns by 25 rows, and the C-64 gives you one that's 40 by 25. Some spreadsheets do program in an 80-column option for the C-64. Commands for moving the window rapidly around should be among the first you learn when you start using this handy tool.

If you're in the market for a high-quality, professional spreadsheet program, one of those on the list accompanying this article should fill your needs. If you'd like to try out a spreadsheet before buying a commercial one, you can use the CalcAid 64 program that appears elsewhere in this issue of *RUN*. As a matter of fact, many people may find that CalcAid is all they'll ever need. R

Address all author correspondence to Joseph J. Shaughnessy, c/o Reynolds, Smith & Hills, PO Box 4850, Jacksonville, FL 32201.

ILLUSTRATED BY CHRIS SPOLLEN

Spreadsheet Glossary

Matrix: A spreadsheet is formatted as a matrix of intersecting rows and columns. At each intersection there's a cell. For instance, a matrix 10 rows by 10 columns would contain 100 cells.

Cell: A "holding box" that contains the information (numeric value, text label or formula) for a specific location in the matrix.

Names of rows, columns and cells: To identify where you are on the spreadsheet, rows and columns are named with either numbers or letters. In some spreadsheets, columns are numbered, starting at zero and progressing by one from the left side. The rows begin with A and continue through the alphabet down from the top line. If there are more than 26 rows, they use combinations of letters, such as AA, AB, AC, etc.

Other spreadsheets use the same basic scheme, but with numbers for the rows and letters for the columns. Either way, cells are identified by a row-column designation. For instance, in the first scheme I described, the name for the Home cell (upper-left corner) would be A0. The name for the cell in the 27th row and 35th column would be AA34. (The first column is 0, so the 35th column is numbered 34.)

In addition to this convenient method for naming cells, some spreadsheets (such as Microsoft Multiplan by Epyx) let you give more descriptive names to your cells, such as Joe's Stuff, Sub-Total or Nov 1986, and you can use these names in formulas; for example: Joe's Stuff * Nov 1986 + Sub-Total. For the most part, however, you'll work with the conventional row-column names for cells.

Value: A number.

Label: Text that identifies or clarifies numbers on the spreadsheet.

Formula: A mathematical expression or equation that manipulates values contained in specified cells to produce a value for the cell holding the formula.

Arithmetic Operators: Symbols for the arithmetic operations, such as addition, subtraction, multiplication, division, exponentiation, squaring, cubing, and so forth. They are used in spreadsheet formulas.

Mathematical Functions: Operations that also appear in spreadsheet formulas such as summing a row or column, finding maximum and minimum values, or figuring percentages, averages and means. Higher-order functions include greater than, less than, equals, square root, absolute value, integer value, logs (either base *e* or base 10), trig functions, Boolean operators, If-Then-Else statements, and others.

Paging: This convenient feature lets you jump your cursor to the next adjacent screen in any direction in one move, rather than repeatedly hitting the cursor keys.

Pages: Some programs can handle multiple pages of spreadsheet information, rather than just one sheet. This way you can do calculations between pages, such as adding the contents of a cell on one page to the contents of a cell on another and putting the result on still a third page. Since the other pages are usually stored on disk, this operation can be painfully slow because of all the disk accesses necessary. However, the C-64 and C-128 should soon have RAM expanders available from Commodore that will let you use a RAM disk for this type of activity.

GOTO or jump to another cell: This feature allows you to jump to any position on your spreadsheet in one move, rather than by repeatedly pressing the cursor keys.

Menu and help screens: Menus display your currently available options; help screens display information on what you can or cannot do at any given moment. Both menu and help screens are designed to keep you from getting stranded in the middle of an operation without knowing what to do next.

Automatic cursor advance: This feature saves keystrokes when you're entering a lot of data. Normally, you'd enter the data for each cell and then hit the return key, but with this feature you enter the data and hit a cursor key, which places the data in the cell where the cursor is located, then advances the cursor to the next cell in the direction of the cursor key selected.

Home Key: With most spreadsheets, hitting the home key once moves the cursor to the top-left cell of the screen, and hitting it twice moves it to the top-left cell of the spreadsheet. However, this function may vary somewhat among spreadsheets.

Clear, or blank, a cell: This feature erases the contents of the cell under the cursor, or even a range of cells.

Edit cells: Most spreadsheets let you edit the contents of a cell. Usually you hit a special key to go to Edit mode, and then you can edit the cell contents just as you would with an ordinary screen editor.

Clear the sheet: This function erases the contents of all the cells on the spreadsheet—a fast way to get a blank slate to work on. Most spreadsheets use the clear key for this, and will ask you "Are you sure?" before erasing.

Cell formatting—individual and global: The formatting function is for selecting how the values and text labels that you enter will appear in both the screen display and the printout. Individual format sets up a single cell; global format sets up either a whole row or column, or the entire spreadsheet. Normally, global formats do not override individual formats, so you can change the general format of a sheet without destroying any special-case cells.

Typical formatting choices, for both individual and global, are as follows:

Left/right justify: Usually, text in a cell lies left-justified against the left border of the cell, and numbers lie right-justified against the right border. You can change these arrangements with this format command. It's most often used on an individual cell, row or column, but could be done globally, as well.

Integer: All numbers after the decimal point are dropped *(not rounded!)*, and only the whole number is displayed.

$: Displays values in dollars-and-cents format (two decimal places).

Scientific: Displays numbers in scientific notation. For instance, 12 × 10 to the fourth power (120,000) would appear as 12E+04. This is useful when working with large numbers that won't fit into the column width you've selected. Some spreadsheets default to scientific notation when numbers become too large to display.

Maximum precision: This, the computer's ordinary floating-point format, displays numbers with as many decimal places as are required or as will fit into the selected column width. It's a display format only, not affecting the precision of numbers in calculations, and it's the default format for almost all spreadsheets.

Decimal: With this function, you can specify the number of decimal points to display, from zero (the same as integer format) to the width of the column. Setting it to 2 would be the same as $ format.

Column width: Some spreadsheets allow only one column-width setting for the whole sheet (at least for the screen display—you can usually format differ-

ent widths for the printout). Other spreadsheets let you select the column-display width for individual columns (my preference). By changing the column width, you can display more (or less) of your spreadsheet on the screen or printout.

Titles: Rows and columns can have titles, and the titles can be locked in place on the screen so that they remain in position as you scroll through the spreadsheet. Once you've used this feature, it's difficult to get by without it.

Graphics: You can set the contents of a row or column to display as hi-res or lo-res graphics on the screen or in a printout. This is useful when you're making presentations to other people.

Color: You can highlight a cell, row or column by displaying it in a selected color.

Long/short text: For the most part, if text is too long to fit inside the display width of a cell, the program displays what there's room for and leaves out the rest. You can retain long lines of text by continuing them through more than one cell, but then, when you change column widths, strange gaps will appear in the text.

With the long/short feature, you can specify that a label will automatically continue displaying over the next cell(s) if it needs the room. This is especially convenient for placing long titles or comments at the top or bottom of a spreadsheet (where there's no danger of overwriting information in adjacent cells).

I have a friend who actually uses his spreadsheet as a word processor by using this feature! If you don't want automatic continuations into adjacent cells, you specify short.

Insert or delete rows and columns: You will need this feature if you find that you need an extra row or column in the middle of what you've already done on a spreadsheet, or if you want to delete some rows or columns you were using only as a scratch pad. Formulas often have to be adjusted after the Insert/Delete function has been invoked, since many rows or columns will have shifted and changed names. Fortunately, the program will make these adjustments for you automatically.

Automatic/manual recalculation: Most spreadsheet programs default to recalculating the whole sheet every time an entry is made into a cell. This is fine for small sheets, but takes impossibly long for large sheets. For the latter, and for entering a lot of data on a new sheet, select Manual mode, so the spreadsheet won't recalculate until you actually tell it to do so by pressing the recalculate key.

Order of recalculation: Most spreadsheets calculate down one entire column, then move to the next column and do it again. On occasion you may want to use this feature to calculate row by row instead of column by column. The order of recalculation can be important if a cell formula references a cell in some succeeding column.

Replicate or copy: This function lets you copy values, text or formulas from cell to cell, leaving the contents of the source cells unchanged. With formulas, the formula itself is replicated, but the program inserts the values appropriate to each particular cell, unless you specify that a value is absolute. The replicate function is sometimes useful for copying text (such as $/Lb.) or a constant value.

You can replicate from one cell to another cell, or from one cell to a range of cells (row, column or block). It's also possible to replicate a row or column to another row or column or a block area, and even a block of cells from one area of the spreadsheet to another. The rule in replicating rows, columns and blocks is that the destination range has to be the same size as the source range.

Move cells: This function works like replication, except it erases the contents of the source cell.

Search: This function searches through your spreadsheet for text or a value, and places the cursor on the cell that contains it.

Sort: This function performs sorts on rows, either alphabetically or numerically. It actually rearranges the rows, and it automatically rereferences all formulas.

Printer formatting: On a final printout, you may want to change such things as column widths, which columns to print, which area of the spreadsheet to print and the print mode (Regular or Condensed).

Timeworks' new spreadsheet program, SwiftCalc, has a built-in option, called Sideways, for printing a spreadsheet sideways, so you're not limited in the number of columns you can print out at one time. (You do have to watch the rows, but that's somewhat easier.) If you already own a spreadsheet program, Sideways is also available as a separate program. It will work with most printers and with most spreadsheets that create ASCII text files.

Table 1. *List of available spreadsheet programs.*

CalKit—
Batteries Included
30 Mural St.
Richmond Hill, Ontario
Canada L4B 1B5
416-881-9941; C-64/$49.95
This is a simplified spreadsheet package for home and small-business use.

Calc Result Advanced—
Handic Software
Distributors: ScanAm
190 Moore St., Suite 202
Hackensack, NJ 07601
800-524-0484; C-64/$74.95
Built-in help screens are included in this 32-page spreadsheet program.

Calc Result Easy—
Handic Software
Distributors: ScanAm
190 Moore St., Suite 202
Hackensack, NJ 07601
800-524-0484; C-64/$29.95
Here is a flexible spreadsheet with on-screen/printer displays and various math functions.

Educalc (School Edition)—
Grolier Electronic Publishing
95 Madison Ave.,
New York, NY 10016
800-858-8858; C-64/$64.95
This is a two-disk spreadsheet package for beginning C-64 users.

Educalc (Lab Pack)—
Grolier Electronic Publishing
95 Madison Ave.,
New York, NY 10016
800-858-8858; C-64/$124.95
This six-disk spreadsheet package is part of Grolier's productivity series.

Intelligent Software Package—
Intelligent Software
PO Box A
San Anselmo, CA 94960
415-457-6153; C-64/$29.95
A word processor, database and spreadsheet are included in this package of 25 home and small-business programs.

Jane 2.0 Series—
Commodore Business Machines
1200 Wilson Drive
West Chester, PA 19380
215-436-4200; C-128/$49.95
This is a productivity package that includes a spreadsheet called Janecalc.

Microsoft Multiplan—
Epyx
600 Galveston Drive
Redwood City, CA 94063
415-366-0606; C-64/$59.95
This program can help you create spreadsheets on your C-64 and has enhanced features for your C-128.

Pocket Series—
Digital Solutions, Inc.
30 Wertheim Court, Unit 2
Richmond Hill, Ontario
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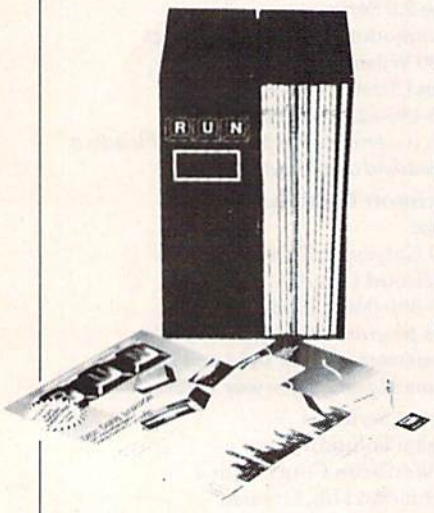

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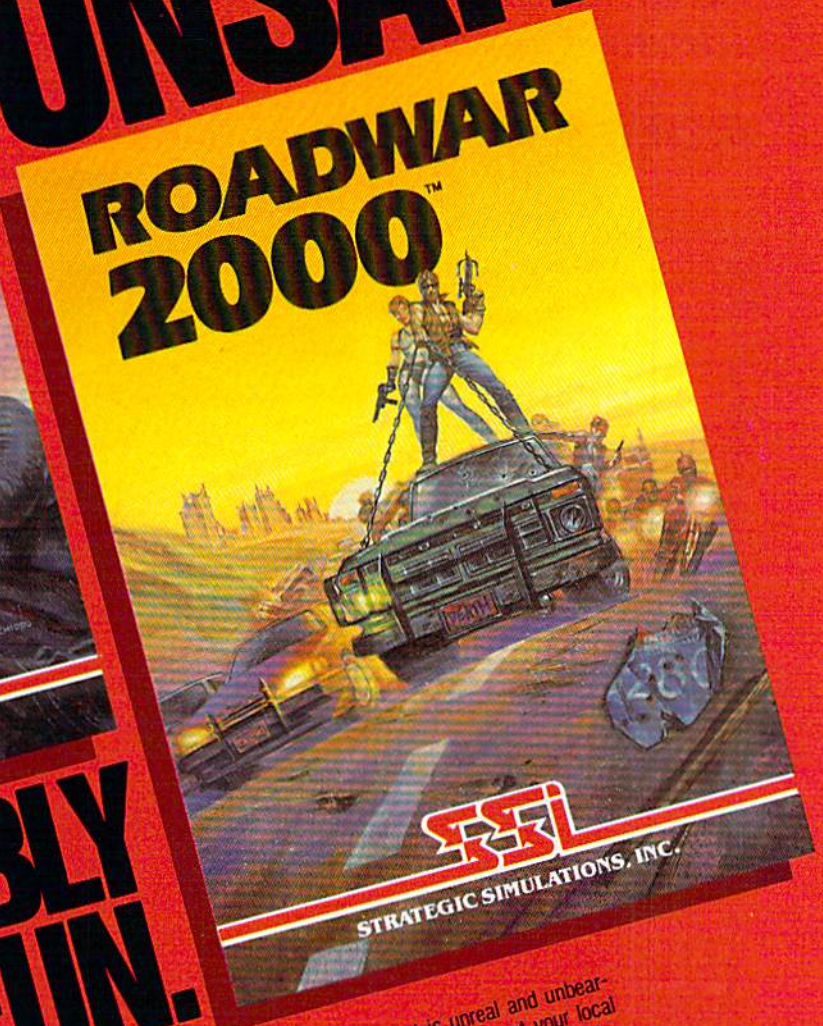

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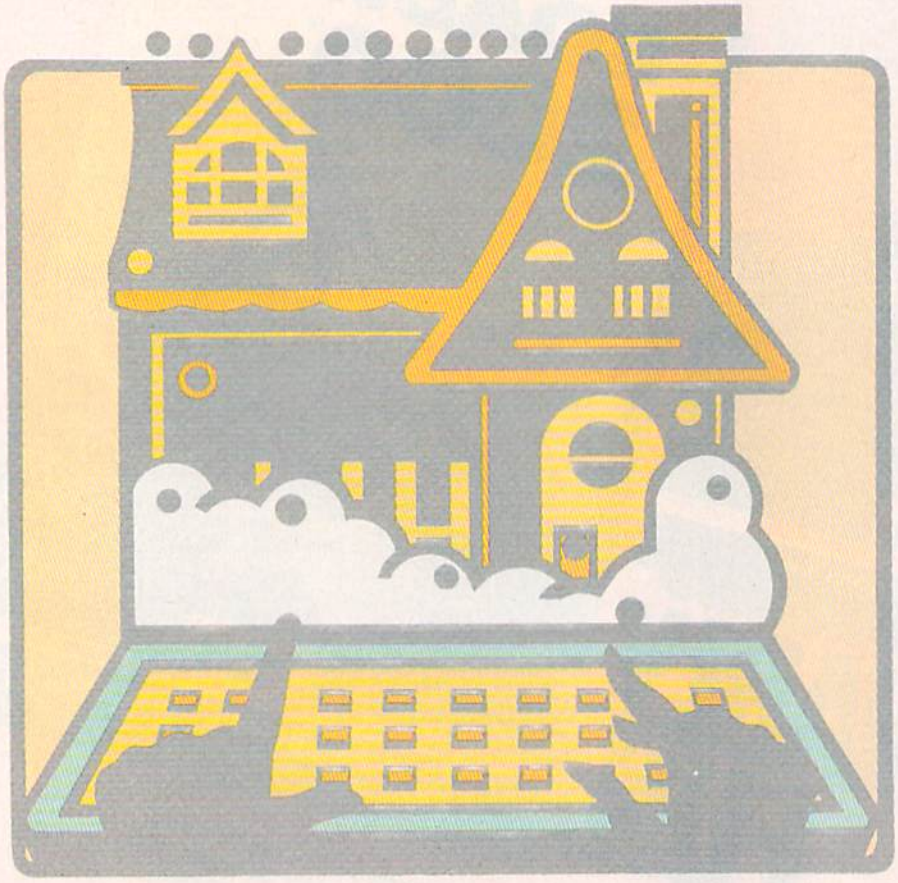
CalcAid 64

This spreadsheet program is one of the most useful tools you'll ever own. You can use it to do anything from balancing a checkbook to performing complex analysis, and it's free.

By TRENT BUSCH



This article will take you step by step through the features of CalcAid 64 and give you a sample spreadsheet to try for yourself.

First make a backup copy of the program on disk or tape, then run it and examine the display.

The flashing cursor at the top left of the screen represents the data entry line. Below that is a solid line running across the screen. This is a comment line that CalcAid 64 uses to display important messages and information. The numbers 0, 1 and 2 represent columns. The letters A through T are the rows.

If you don't like the screen colors, you can change them at any time. The F7 key changes the background color, and the F8 key steps through the border colors. To change the text color, simultaneously press the CTRL key with any number key from 1 to 8. Upon your next operation, the entire text will change color.

CalcAid 64 has 30 columns and 26 rows. Each column can display up to nine characters. Notice that only three columns are displayed on the screen. All 30 are there; you just cannot see them all at once. Imagine that you are looking through a window and can only see a portion of the overall picture.

The cursor keys allow you to move this window around the spreadsheet. Press the cursor-down key, and the spreadsheet will be quickly redrawn with rows B through U. Notice that the text is now the color that you chose. Experiment with the cursor keys until you can place the viewing window over all the columns and rows. Pressing the home key will return the window to A0.

Entering Information

The intersection of a column and a row is called a cell. There are 780 cells that you can use, A0–Z29. There are three types of information that you can enter into a cell: text, numeric or formula.

In order to enter information into a cell, you need to follow a specific procedure. Type in the cell location, row first and column second, without putting in any spaces. Next, type a colon. This separates the cell location from the data. Now you can type in text or numeric data up to nine characters:

```
A0:BUDGET 84
C12:250
```

Text information can contain almost any character on the keyboard, but must not begin with a number or a plus or minus sign. Numeric

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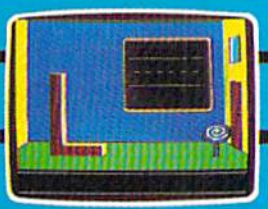

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NOTE TO PARENTS: After loading, all three lessons may be enjoyed by your children without your direct supervision. However, the educational value can be enhanced by your participation and encouragement.

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information, however, *must* start with a number or a plus or minus sign.

After typing in your information, press the return key. If everything was typed in correctly, you should see the data in the proper cell. If you didn't enter your information properly, CalcAid 64 will display a Format error message on the display line. To rectify this, simply retype the entire line correctly. Text data will be left-justified, while numeric data will be right-justified.

To replace data, just retype the cell coordinates, a colon and the new data. To clear text or numeric data from a cell, simply type the cell coordinates followed by a colon and then press the return key. This procedure will not clear a formula, however.

Pressing SHFT CLR will clear the entire spreadsheet. For safety reasons, this is a two-step process. First, press SHFT CLR and then answer the question on the comment line. Press Y to clear the spreadsheet. Press N to exit the Clear mode.

Table 1. *Sample printout of CalcAid 64 program.*

	0	1	2	3	4	5	6
A	BUDGET 84	RENT	CAR LOAN	GAS	ELECTRIC	TELEPHONE	CABLE TV
B							
C	JANUARY	560	175	110	40	30	15
D	FEBRUARY	560	175	120	40	45	15
E	MARCH	560	175	80	40	30	15
F	APRIL	560	175	70	40	30	15
G	MAY	560	175	30	40	30	15
H	JUNE	560	175	25	60	30	15
I	JULY	560	175	20	75	30	15
J	AUGUST	560	175	20	80	30	15
K	SEPTEMBER	560	175	35	45	40	15
L	OCTOBER	560	175	40	40	30	15
M	NOVEMBER	560	175	55	40	30	15
N	DECEMBER	560	175	80	40	40	15
O							
P	---------	---------	---------	---------	---------	---------	---------
Q	TOTAL	6720	2100	685	580	395	180
R							
S	MINIMUM	560	175	20	40	30	15
T							
U	MAXIMUM	560	175	120	80	45	15
V							
W							
X	---------	---------	---------	---------	---------	---------	---------
Y	BUDGET	560	175	57	48	33	15
Z	---------	---------	---------	---------	---------	---------	---------

	7	8	9	10	11	12	13
A	GASOLINE	FOOD	CHARGES	CLOTHES	INSURANCE	MISC.	TOTALS
B							
C	50	450	100	75	75	250	1830
D	60	450	100	75	75	250	1965
E	60	450	100	75	75	250	1910
F	60	450	100	75	75	250	1900
G	65	475	100	75	75	250	1890
H	80	475	100	75	75	250	1920
I	90	475	100	75	75	250	1940
J	75	500	100	75	75	250	1955
K	70	500	100	75	75	250	1940
L	70	500	100	75	75	250	1930
M	80	525	100	75	75	250	1980
N	100	525	100	75	75	250	2035
O							
P	---------	---------	---------	---------	---------	---------	---------
Q	860	5775	1200	900	900	3000	23295
R							
S	50	450	100	75	75	250	1840
T							
U	100	525	100	75	75	250	2120
V							
W							
X	---------	---------	---------	---------	---------	---------	---------
Y	72	481	100	75	75	250	1941
Z	---------	---------	---------	---------	---------	---------	---------

Table 2. *Printout of formulas used in demonstration of program in Table 1.*

C 13	SUMC1-C12	D 13	SUMD1-D12	E 13	SUME1-E12	F 13	SUMF1-F12
G 13	SUMG1-G12	H 13	SUMH1-H12	I 13	SUMI1-I12	J 13	SUMJ1-J12
K 13	SUMK1-K12	L 13	SUML1-L12	M 13	SUMM1-M12	N 13	SUMN1-N12
Q 1	SUMC1-N1	Q 2	SUMC2-N2	Q 3	SUMC3-N3	Q 4	SUMC4-N4
Q 5	SUMC5-N5	Q 6	SUMC6-N6	Q 7	SUMC7-N7	Q 8	SUMC8-N8
Q 9	SUMC9-N9	Q 10	SUMC10-N10	Q 11	SUMC11-N11	Q 12	SUMC12-N12
Q 13	SUMQ1-Q12	S 1	MINC1-N1	S 2	MINC2-N2	S 3	MINC3-N3
S 4	MINC4-N4	S 5	MINC5-N5	S 6	MINC6-N6	S 7	MINC7-N7
S 8	MINC8-N8	S 9	MINC9-N9	S 10	MINC10-N10	S 11	MINC11-N11
S 12	MINC12-N12	S 13	SUMS1-S12	U 1	MAXC1-N1	U 2	MAXC2-N2
U 3	MAXC3-N3	U 4	MAXC4-N4	U 5	MAXC5-N5	U 6	MAXC6-N6
U 7	MAXC7-N7	U 8	MAXC8-N8	U 9	MAXC9-N9	U 10	MAXC10-N10
U 11	MAXC11-N11	U 12	MAXC12-N12	U 13	SUMU1-U12	Y 1	AVGC1-N1
Y 2	AVGC2-N2	Y 3	AVGC3-N3	Y 4	AVGC4-N4	Y 5	AVGC5-N5
Y 6	AVGC6-N6	Y 7	AVGC7-N7	Y 8	AVGC8-N8	Y 9	AVGC9-N9
Y 10	AVGC10-N10	Y 11	AVGC11-N11	Y 12	AVGC12-N12	Y 13	SUMY1-Y12

Calculations

While you now know how to create neat columns and rows, the real power of CalcAid 64 lies in its ability to do mathematical computations using the data in each cell. For example, you can add cell A0 to cell A1 and put the answer in cell A2. This is accomplished by putting the formula A0 + A1 into cell A2. Here is the proper format:

A2: {F1} A0 + A1

The F1 key will result in a reverse-character F on the screen. This key is used to access the special features of CalcAid 64. If you forget to press F1 when entering a formula, the formula will be entered as text and displayed in the cell. Only the result of the computation, not the formula itself, should be displayed in a cell.

A special command allows you to view the formula in a particular cell:

A2:{F1}V

If a formula resides in cell A2, it will be printed on the comment line. The full value of the numeric data in cell A2 also will be printed. This is important, because each column is limited to nine characters. CalcAid 64 will fill the cell with asterisks if the numeric data is longer than nine characters. You will then need to use the View command to examine that cell.

Here are the formulas that this spreadsheet can use for computation:

addition: cell + cell or cell + constant

subtraction: cell – cell or cell – constant

multiplication: cell*cell or cell* constant

division: cell/cell or cell/constant
exponentiation: cell↑cell or cell↑constant

CalcAid 64 cannot handle complex formulas. A more involved computation can be done by storing the intermediate answer in a spare cell. Extra characters after the second cell or constant will be ignored or show up as a Format error. When typing in a formula, leave out all spaces and be sure to enter the cell first and the constant second.

After you enter a formula and press the return key, you must press the left-arrow key. Wait for the calculation to be performed. During calculations, there will be a working message on the comment line. Calculations are done column by column from top to bottom. Column 1 will be completely done before column 2. This is an important point.

For example, let cell A0 = F9*G6. If cell F9 has a formula in it, the resulting answer will be figured after cell A0 is computed. To overcome this, you should press the left-arrow key twice. After all computations are complete, the spreadsheet will be redrawn with the results displayed in the proper cells. Attempts to divide by 0 will be noted in that cell, as will an overflow note if an exponentiation calculation is too large.

Commands and Special Features

CalcAid 64 has several other commands that are very useful. The following examples show the proper format for the commands. You may use any cells that you wish. The range must be in a straight row or column, with the first coordinate smaller than the second.

A1:{F1}SUMA2 – Z2

This command puts the sum of cells A2–Z2 into cell A1. Text data is ignored.

Z29:{F1}AVGB3 – B12

This command calculates the average of cells B3–B12 and puts the answer into cell Z29. Any text data is ignored.

C12:{F1}MIND0 – G0

This command looks for the minimum figure over a range of cells and puts the answer in cell C12. Text data is ignored.

F5:{F1}MAXZ0 – Z29

This is similar to the MIN command except it returns the maximum value in a range. Again, text data is ignored.

Remember, you can use any cells that you wish, but they must be in a straight column or row.

Z29:{F1}SUMA0 – D29

This formula will not work because cells A0–D29 are in a diagonal.

Here are the rest of CalcAid 64's special features:

A0:{F1}T

This command makes row A and column 0 titles that are always displayed on the screen. This is helpful in remembering what each cell is supposed to be. As you move your display window around, you can always have a reference to numeric displays. You must always use cell A0 in this command.

A0:{F1}O

This command turns off the Title mode. The cell must always be A0.

C15:{F1}C

This command will clear an individual cell, including the formula, text and numeric data.

F25:{F1}J

This command jumps the display to a particular area of the spreadsheet. Sometimes this is faster than using the cursor keys to move the display window.

D3:{F1}COPD4 – D29

This command is used when you are entering lots of identical information. In this example, the contents of cell D3 will be copied into cells D4–D29. Only text or numeric information can be copied. Formulas must be typed individually. This works with rows or columns.

Press F2 and you will see a maximum precision display on the comment line. This command does not affect the accuracy of the calculations. It rounds the number only for display purposes. Use the View command to see the full value. Press a number from 0 to 6. Zero means integers and 6 means six decimal places. CalcAid 64 is automatically set up for two decimal places. This command is only for numbers that are computed by a formula. If you want two-place decimals on all the numbers, you must type them that way.

Press F4 and follow the screen directions to save the spreadsheet to tape or disk. Pick out a logical filename under which you can save the spreadsheet.

The more you use this program, the more applications you will find for it.

Press F3 and follow the screen directions to load the spreadsheet from tape or disk.

To print the spreadsheet on paper, press F5 and follow the screen directions. You can print the whole spreadsheet or any portion of it. You will need to know the top-left cell coordinates and the bottom-right cell coordinates of the area that you want printed out. If you specify more than seven columns, CalcAid 64 will automatically break the printout into sections for you.

To print the formulas on paper, press the F6 key and follow the screen directions.

The possible uses for this program are innumerable. To start, you might want to copy the budget planner spreadsheet (see Table 1) and adapt it to your own needs. All the formulas are listed in Table 2. The more you use this program, the more applications you will find for it. R

Address all author correspondence to Trent Busch, 716 Roscoe Ave., Muscatine, IA 52761.

Listing 1.

Example of CalcAid 64 program, with a budgeting application.

```
Ø REM CALCAID 64          :REM*178
1 DIMDA$(25,29),FC$(25,29),CU$(2
  ),DA(25,29)             :REM*171
5 CU$(1)=CHR$(18)+" "+CHR$(146)+
  CHR$(157):CU$(2)=" "+CHR$(157)
                          :REM*169
6 PA=1:Z=Ø:P=1ØØ          :REM*82
2Ø GOSUB1ØØØØ             :REM*2
3Ø PRINTCHR$(19);         :REM*136
4Ø FORT=1TO1Ø:GETG$:NEXT:REM*114
5Ø IN$=""                 :REM*252
```

Continued on p. 112. →

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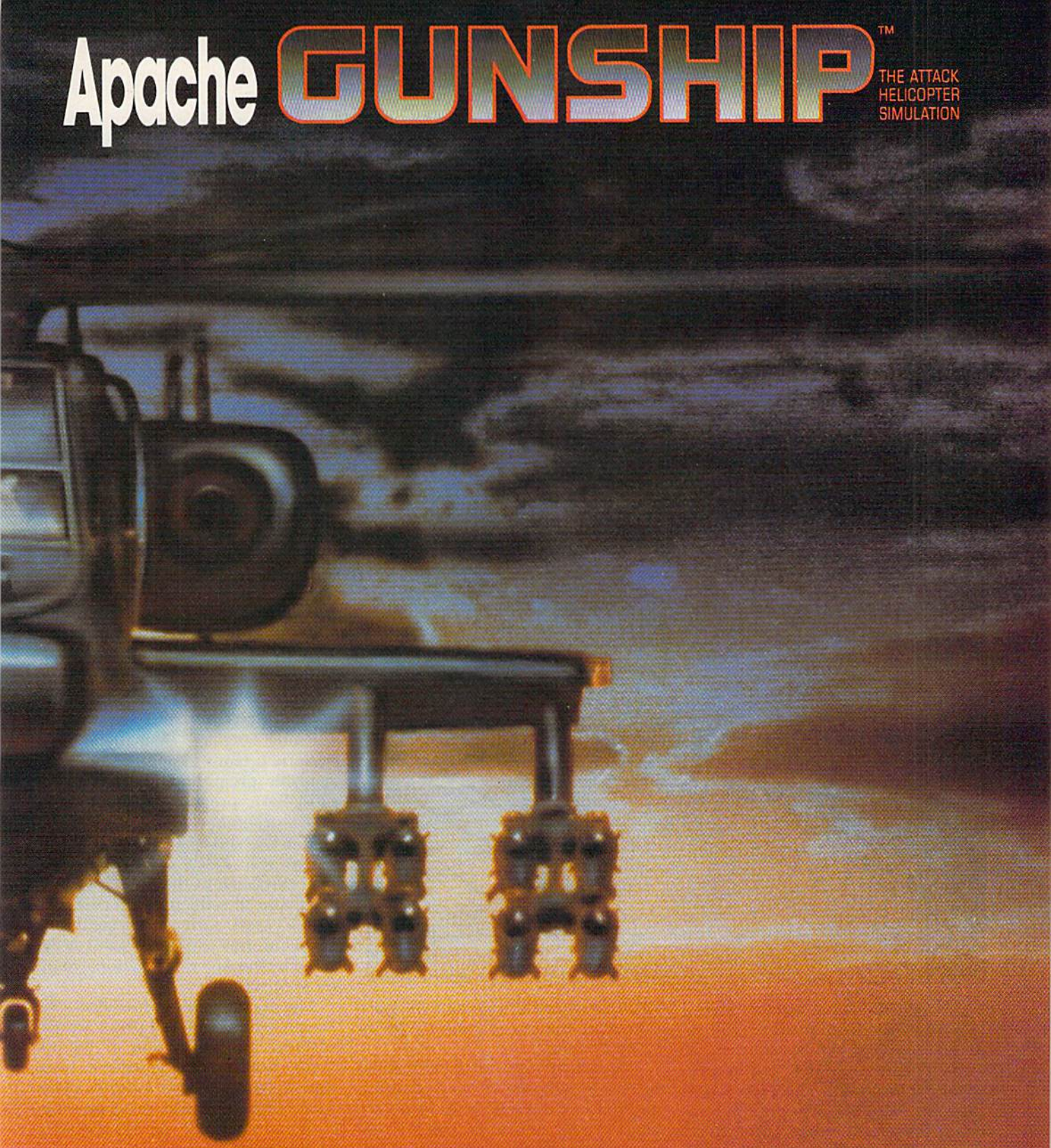

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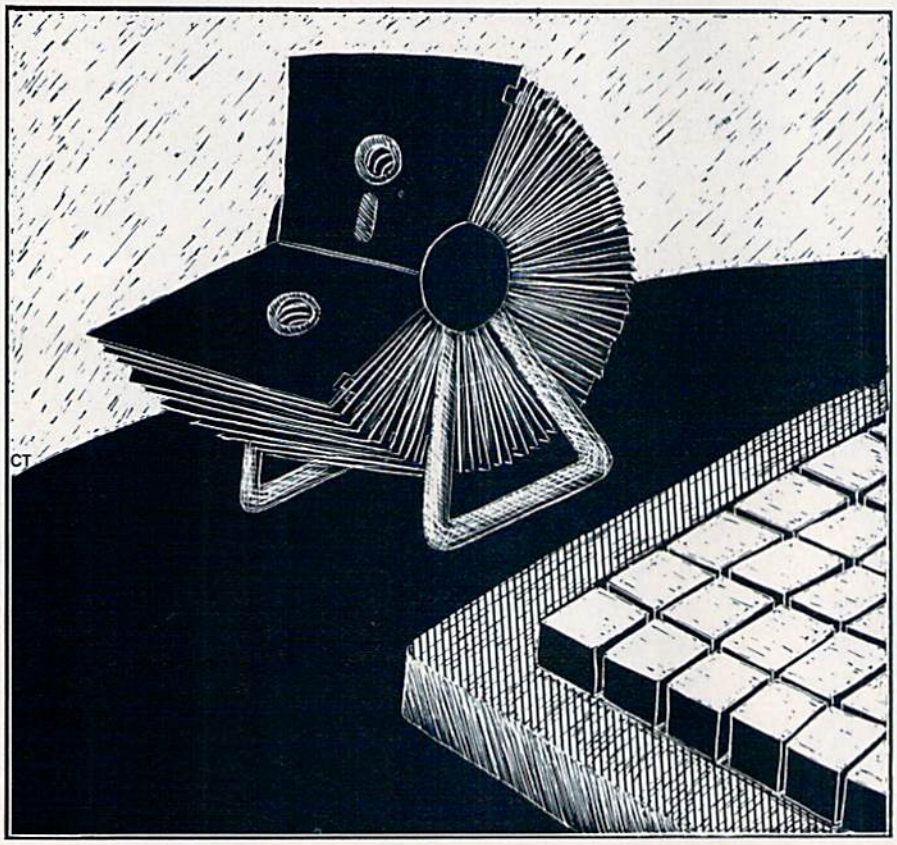
By ROBERT ROCKEFELLER



As you no doubt already know, the new Commodore 128 is actually three computers in one—it can run C-64, C-128 and CP/M 3.0 programs. The 128's CP/M capability offers Commodore users a better opportunity than ever before to take advantage of the wealth of software available for the CP/M operating system, much of it from public domain sources at a price of $10 or less a disk. Most CP/M software was designed to run under the version of CP/M known as 2.2, but 80 to 90 percent of it will run on the C-128 in CP/M 3.0 mode.

The primary sources of CP/M public domain software are user's groups, and some of the large ones issue catalogs. You'll notice as you peruse these catalogs that a large proportion of the programs are utilities—either system utilities or programmer's utilities such as languages. In this article, I'll describe some of these CP/M public domain utilities that are particular favorites of mine, as well as a CP/M game I like to play.

All the programs I mention will run on a one-drive system. Depending on where you get the programs, they may require a 1571 drive. When working with CP/M, an 80-column screen is highly recommended, although not absolutely necessary.

A Pascal Compiler

The first programs on the agenda are a Pascal compiler called Yale Pascal and some system utilities compiled by Yale Pascal that accompany it on the disk. Pascal is favored as a teaching language in many schools because it tends to enforce a logical, readable programming style; unlike most Basic programs, a well-written Pascal program can be a work of art.

Yale Pascal is a CP/M adaptation of a European Pascal compiler written by a physician at the Yale School of Medicine; thus the name. It compiles a full Pascal, with some extensions, that conforms closely to Pascal as defined by the American National Standards Institute.

The documentation included with the program (about 40 pages' worth) includes an explanation of the six areas where Yale Pascal deviates from the standard. It also assumes prior knowledge of Pascal programming, so if you intend to use this compiler to learn the language, you'll need a book, too.

Yale Pascal comes on two disks and includes about 35 compiler options that enable you to produce source listings, select debugging and tracing

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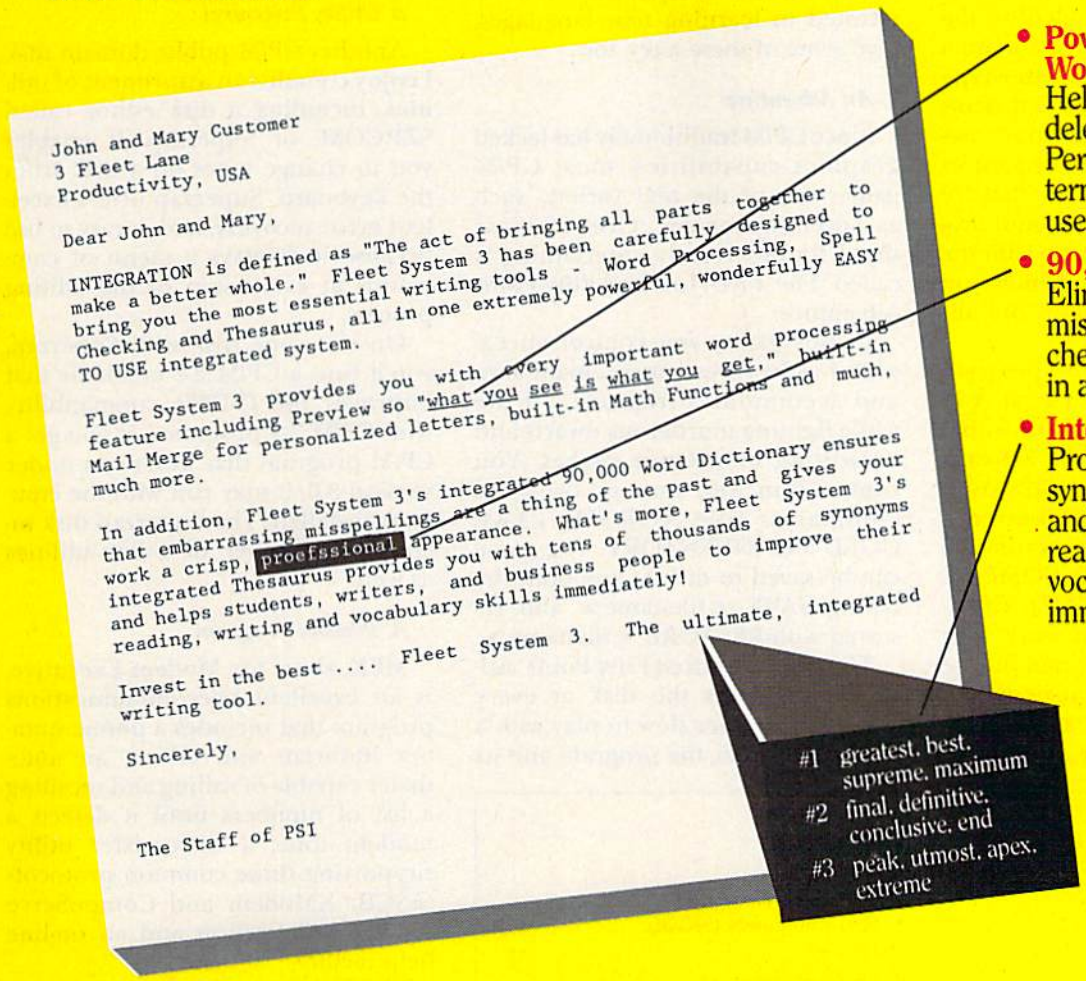
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modes, compile multiple source files, and more. It doesn't compile to Z-80 machine code, but to an intermediate code known as P-code. For this reason, it executes a little more slowly than Basic 7.0 in Fast mode, and you can't run a Yale Pascal program just by typing its name, as with most CP/M programs. You first must load a P-code interpreter called RUNPCD into memory. For example, to run a program called TEST.PCD, you'd enter RUNPCD TEST at the prompt.

Many system utility programs compiled by Yale Pascal, some more useful than others, are included on the distribution disk. Among them are a disassembler and many filter-type programs that locate specified items in textfiles. There are also some useful submit files, which are sequences of commands in textfile form that are executed by the CP/M 3.0 Submit program. The submit files come with the filename extension .job, which you must change to .sub before Submit can use them.

Before you can compile a program of your own with Yale Pascal, you have to type your program in with a text editor, such as CP/M's ED or a more sophisticated word processor. After you've typed it in and saved it on your Yale Pascal disk, you compile it by entering SUBMIT COMPILE <filename>. (The SUBMIT COMPILE procedure will not work with the TIMERUN2.PAS program on the disk, because the latter is segmented.) Compilation takes quite a while; for example, it took me 16 minutes to compile a 13-kilobyte sample program on the disk.

Yale Pascal is an excellent vehicle for learning and experimenting with Pascal programming, and it offers unbelievable price/performance value. I recommend it to all who are interested in expanding their knowledge of programming.

There are dozens of other CP/M public domain languages available that I haven't tried yet. They include Lisp interpreters, Forth, Basic interpreters, a C compiler, an APL interpreter, Pilot and Algol. If you're interested in learning new languages, give some of these a try, too.

An Adventure

Since CP/M traditionally has lacked graphics capabilities, most CP/M games are of the text variety, such as adventure games. One of these that I find extremely entertaining is called The Five-Hundred-Fifty-Point Adventure.

In this game, you control an explorer as he investigates a giant cave and accumulates treasure, all the while fighting murderous dwarfs and outwitting monstrous snakes. You control him with one- or two-word commands like NORTH, TAKE GOLD and INVENTORY. The game can be saved to disk at any point by typing SAVE <filename> and restored with RESTORE <filename>.

The Five-Hundred-Fifty-Point Adventure accesses the disk at every turn, so it's rather slow to play with a 1541 drive. Also, the program and its datafiles require about 190K of storage space, so they won't fit on one 1541 disk. However, you can play with a single 1541 drive by copying the file ADV.COM to one disk and the datafiles to another. If you do this, start the program by entering E:ADV, then insert the program disk in the drive and press the return key. When a prompt appears saying INSERT DISK IN DRIVE A, insert the data disk and press return again. This technique makes use of the C-128's virtual drive, drive E.

A Utility Potpourri

Another CP/M public domain disk I enjoy contains an assortment of utilities, including a disk editor called SZP.COM, or Superzap. It enables you to change bytes on a disk from the keyboard. Superzap offers excellent error recovery, and is easy to use because it displays a menu of commands at every step of the editing process.

On the same disk with Superzap, you'll find a CP/M 2.2 emulator that improves the C-128's compatibility with CP/M 2.2 programs. If you get a CP/M program that won't run under version 3.0, it may run with the emulator installed. The Superzap disk includes a number of other utilities as well.

A Telecom Program

MEX, short for Modem Executive, is an excellent telecommunications program that includes a phone number librarian and editor, an auto-dialer capable of calling and recalling a list of numbers until it detects a modem tone, a file-transfer utility supporting three common protocols (ASCII, XModem and CompuServe A), key redefinition and an on-line help facility.

In contrast to the many C-64 terminal programs that are controlled through menus, MEX is controlled by commands you type in. It also includes a batch-command file processor for accepting command input from a disk file.

MEX offers over 50 commands, among them a number of versions of the Call command that you can use if you have an auto-dial modem. The Call command instructs MEX to dial a number over and over again until it detects a modem tone; or to dial one number, then a second if no mo-

Table 1. *Some noteworthy sources of CP/M public domain software.*

Canada Remote Systems
4198 Dundas St. West
Toronto, Ontario
Canada M8X 1Y6
416-231-2383 (weekday evenings, 5–9)

(You can access Canada Remote on-line through Telenet in the U.S. and Datapac in Canada.)

The Canada Remote volume numbers of the disks featured in this article are:

Yale Pascal—PK/49
Five-Hundred-Fifty-Point Adventure—CO/02 (specify the C-128 version)
CP/M 3.0 utilities—CO/68

First Osborne Group (FOG)
PO Box 3474
Daly City, CA 94015
415-755-2000

Special Interest Group for Microcomputers (SIG/M)
PO Box 97
Iselin, NJ 08830

CP/M Users Group (CP/MUG)
1651 Third Ave.
New York, NY 10028

Poseidon Electronics
Ralph S. Lees, Jr.
103 Waverly Place
New York, NY 10011
212-777-9515

Elliam Electronics
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dem tone is obtained at the first; or to dial a prescribed number of times, then give up if no modem tone is forthcoming.

MEX offers more functions than many commercial C-64 programs at an unbeatable price. Make it your first CP/M public domain program if you are serious about telecommunicating.

Where To Get It

Now the big question: Where do you get these great-sounding programs? The answer is, many places.

If you live in a city with a large CP/M user's group, you can probably get the disks from them. Their programs may come from The Special Interest Group for Microcomputers (SIG/M) in Iselin, New Jersey, which maintains an extensive CP/M public domain library and distributes its programs through local user's groups throughout the United States, Canada and elsewhere. If you don't have any local SIG/M distributor, you can contact their main office directly.

New York City's CP/M Users Group (CP/MUG) is another good source, as is the First Osborne Group (FOG) in Daly City, California. FOG is developing a CP/M library specifically for the C-128. In fact, through the end of the year, they're offering C-128 owners a free introductory CP/M disk with a $25 FOG membership.

Many of the larger Commodore user's groups now offer CP/M disks. However, they may not have all the programs I've mentioned, since some of them are just starting to support the C-128.

For slightly more than user's groups ordinarily charge, public domain software is available from commercial sources such as Poseidon Electronics in New York City and Elliam Electronics in Woodland Hills, California. You may get faster service from the commercial sources, since the user's groups are sending out disks on volunteer time.

Another place to get CP/M user-group software is on-line from local bulletin boards, remote CP/M (RCP/M) bulletin boards and CompuServe's CP/M SIG. Canada Remote Systems, in Islington, Ontario, claims to have the largest CP/M library in North America, and they will also send out programs on disk. I got most of my CP/M programs from them.

There's a more thorough discussion of many of these sources in the "CP/M Treasure Trove" article in the January 1986 issue of *RUN*. That article also includes a comprehensive list of SIG/M distributors in the U.S. and Canada, including bulletin board numbers for the groups that have them. See Table 1 for the addresses of the sources specifically mentioned in this article.

When you inquire about programs, ask if they'll run on your disk drive. Disks from most sources will require a 1571 drive. The most likely place to get 1541-compatible disks is from a Commodore user's group.

Wherever you get your CP/M public domain software, as you peruse the catalogs and disk directories, you'll find that I've barely scratched the surface of what is available. Get involved in CP/M and explore a whole new software world!■

Address all author correspondence to Robert Rockefeller, R.R. #4, Langton, Ontario, Canada N0E 1G0.

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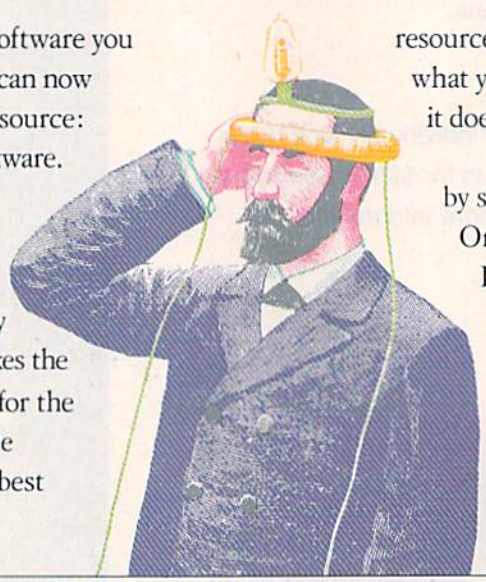

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The player commands the United Kingdom forces whilst the computer commands those of the Argentine, and the simulation takes place over 25-30 days depending on which level of difficulty is selected

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The Battle of Britain took place between July and October of 1940, and was the German Luftwaffes attempt to defeat the R.A.F. and gain air superiority prior to Operation Sealion – the invasion of Great Britain scheduled for the summer of that year. The ensuing battle has gone down in history as one of the most courageous of WWII culminating in the defeat of the Luftwaffe and the cancellation of Operation Sealion.

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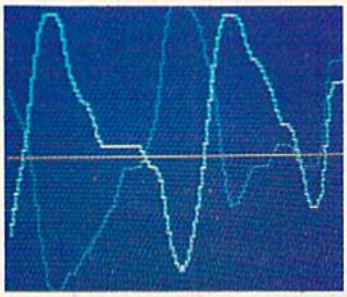

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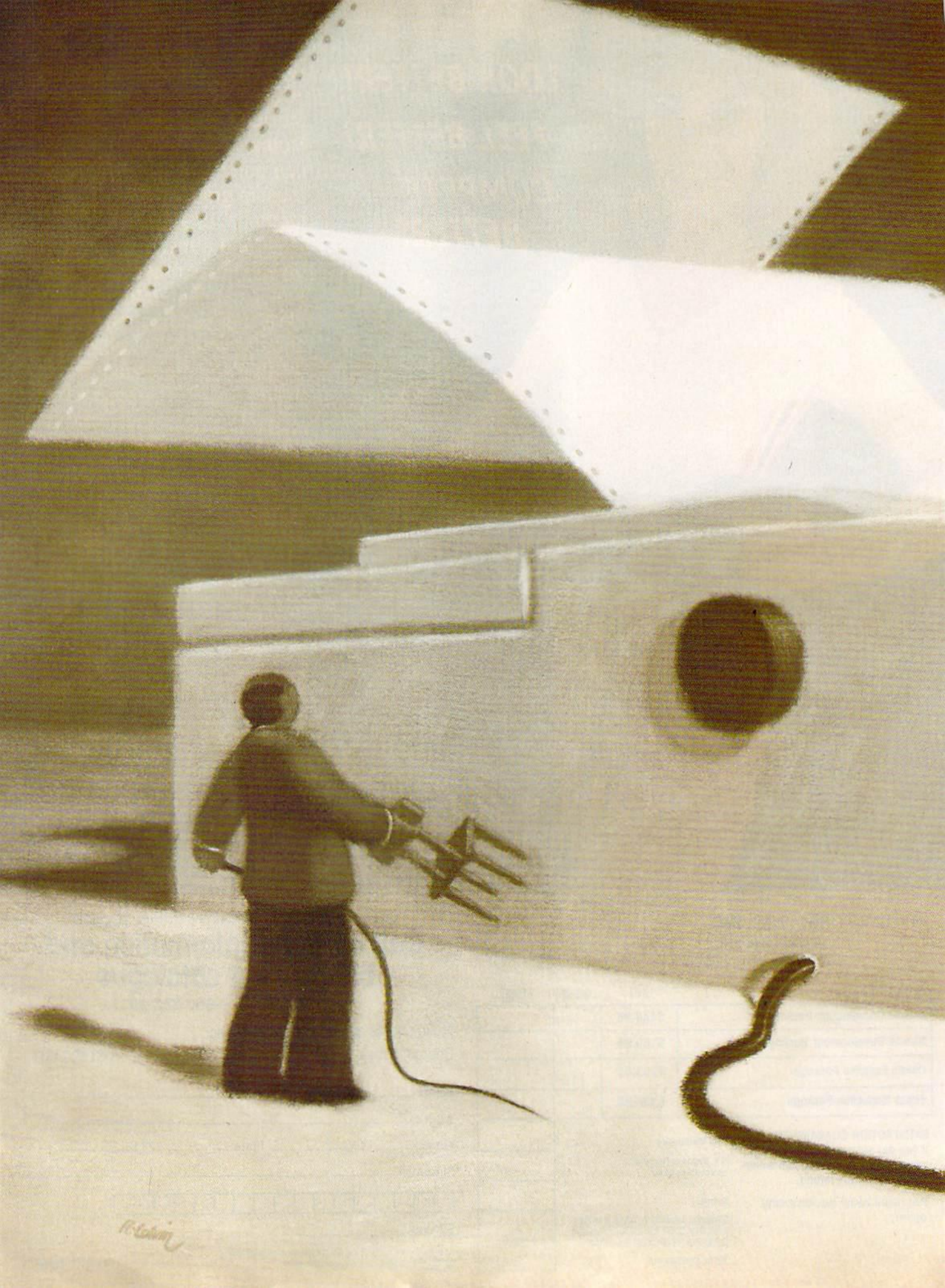

CONTROLLING YOUR PRINTER

Dispel the mystery surrounding interfaces, and so gain access to all your printer's capabilities.

By JOSEPH J. SHAUGHNESSY

For Commodore users, the main drawback of having a non-Commodore printer is that it requires an interface between the computer and the printer. For the average user, such interfaces are complicated, mysterious objects that seem designed to make you feel stupid and frustrated. As a result, most interfaces end up being set in the Commodore Emulate mode and are never touched again until a piece of software won't print and you are forced once again to battle with the interface. This is a pity, for you may then never get to use most of the wonderful features that induced you to buy your printer in the first place.

This article attempts to remove the mystery surrounding interfaces and to explain how to use some of the fancy features that are available on most printers today.

Speaking the Same Language

In order for computers to talk to each other or for a printer to get instructions from any brand of computer, the two machines have to speak the same language. The ASCII (pronounced as-key) communications standard, developed before any personal computer appeared on the market, was designed to make this possible.

In ASCII, seven bits of each byte were used for data, and the eighth for a simple error check on the data transmission (called parity). This provided 128 (0 to 127) possible values, which at first seemed ample for any letters, numbers, punctuation, symbols or commands you might want to enter.

For Commodore's first personal computer, however, 128 values proved insufficient. That machine, the PET-2001, had a complete set of business graphics characters and both upper- and lowercase letters available from the keyboard. Not only that, but every character could also be displayed in reverse.

With the use of Basic and just the characters and graphics available from the keyboard, you could make great forms, charts and graphics presentations to display on the screen. However, all the available keyboard characters—upper/lowercase, uppercase and graphics, plus the graphics available with the Commodore key—amounted to considerably more than the 128 characters ASCII provided.

So Commodore decided to modify the standard ASCII code by using the full byte (including the eighth bit), thus allowing for 256 characters. This expanded ASCII has become known as PETASCII, or Commodore ASCII.

The fly in the ointment was that most existing printers expected to receive true ASCII, not PETASCII. Commodore's answer was to produce its own printers, designed to receive PETASCII. Commodore computers can now use ASCII printers, but you need an interface that will convert PETASCII to ASCII.

In simplest terms, your printer speaks ASCII, the computer speaks PETASCII, and the interface is the translator. You *could* write a program that would convert PETASCII to ASCII before the code was sent to the printer, but you'd need a special cable and probably some knowledge of electronics to convert the serial output from the computer into the parallel input the printer is expecting. If you wanted to get really fancy, you could use dot addressing on the printer to create all of the special Commodore graphics. But when finished, you'd find that you had made a printer interface.

Most interfaces that you can buy do all of these things. Some offer even more features, such as print buffers, their own character fonts, reset switches, and so on. The more an interface does, however, the harder it is to understand. To get the most out of your printer and interface, you'll have to learn about secondary addresses and printer control codes. I'll try to make it painless.

ILLUSTRATED BY ROB COLVIN

Secondary Address Table

By JOSEPH SHAUGHNESSY

The accompanying article, "Controlling Your Printer," discusses how interfaces and printers interact. In order to incorporate special features in your printouts, you must send secondary addresses and control codes to your interface and printer. Many programs published in *RUN* perform certain printer options. If you do not have the same printer that the program was written for, then you'll have to customize the program to match your own printer.

The following table provides a quick reference for secondary addresses pertaining to seven popular printers and seven interfaces for Commodore computers. These will help you customize and use existing programs and commercial software.

The Printer Control Code chart that appears on pages 60–63 shows the control codes that you would use to operate 14 popular printers. There is some overlap in these tables because some printers have built-in interfaces, and some interfaces perform some of the printer's functions.

DEVICES / ACTION/FUNCTION	Commodore 1525 or MPS-803; Okimate 10 Printer	Commodore 1526 or MPS-802 Printer
Emulate Commodore uppercase/ graphics with linefeeds	0	0
Emulate Commodore uppercase/ graphics with no linefeeds	N/A	N/A
Emulate Commodore upper/ lowercase with linefeeds	7	7
Emulate Commodore upper/ lowercase with no linefeeds	N/A	N/A
Transparent mode with linefeeds	N/A	N/A
Transparent mode with no linefeeds	N/A	N/A
Emulate Commodore uppercase text; graphics replaced by mnemonics or decimal value; with linefeeds	N/A	N/A
Same as above, with no linefeeds	N/A	N/A
Emulate Commodore upper/ lowercase text; graphics replaced by mnemonics or decimal value; with linefeeds	N/A	N/A
Same as above, with no linefeeds	N/A	N/A
Reset printer	N/A	10
Additional commands available in Emulate mode?	Yes	Yes
Hex dump of data	N/A	N/A
Uppercase fonts and graphics	N/A	N/A
Upper/lowercase fonts and graphics	N/A	N/A
Special formatting and diagnostics with secondary address (SA)	N/A	Yes (1–6)
Command channel	N/A	N/A
Lock-in SA (secondary address) by adding 20 to SA	N/A	N/A

N/A = not applicable
1—Other features of the Xetec Super Graphix interface include: transparent

Secondary Addresses

To use your printer, you must open a printer file with the typical command

```
OPEN 3,4,7
```

The first number (3 in this example; you select it) is the file number; 4 is the device number (printers can be either 4 or 5); 7 is the secondary address. You can think of secondary addresses as overall formatting instructions that the interface interprets for the printer. Printers aren't really concerned with secondary addresses, but interfaces need them. (If you don't actually enter one in the Open command, the default value is zero.)

The early Commodore printers for the VIC-20 and C-64

Commodore MPS-1000 Printer	Okidata 120 Printer	Tymac Connection Interface	Xetec Super Graphix Interface[1]	Xetec Super Graphix Jr Interface	Micrografix MW-350 Interface	Omnitronix Printmaster /+G Interface[2]	Cardco CARD/? A (No graphics) Interface	Cardco CARD/? +G Interface
0	0	0	0	0	0	0	0	0
N/A	N/A	1	1	1	0, then control code	1	1	1
7	7	7	7	7	7	7	7	7
N/A	N/A	8	8	8	7, then control code	8	8	8
N/A	N/A	Use DIP switch	4	4	5	4	4	4
N/A	N/A	6	5	5	By DIP switch	5	5	5
N/A	N/A	2	Available through the command channel	Available through the command channel	1	2	2	0
N/A	N/A	3	Same as above	Same as above	1, then control code	3	3	1
N/A	N/A	4	Same as above	Same as above	8	12	6	7
N/A	N/A	5	Same as above	Same as above	8, then control code	13	By DIP switch	8
10	10	Push button	Push button	N/A	Push button	Push button	N/A	N/A
Yes	Yes	Yes	Yes, by command channel	Yes, by command channel	Yes	Yes, by command channel	N/A	N/A
N/A	N/A	N/A	3	3	Decimal	9 & 10 decimal	N/A	3
N/A	N/A	N/A	2	N/A	N/A	N/A	N/A	6
N/A	N/A	N/A	9	N/A	N/A	N/A	N/A	6
Yes (1–6)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	15	15	N/A	15	N/A	N/A
N/A	N/A	N/A	Yes	Yes	Lock-in by control code	By command channel	Yes	Yes

with text in fonts (SA 6); font downloading (SA 11); hi-res screen dump (SA 12); uppercase screen dump (SA 13); upper/lowercase screen dump (SA 14).

2—Omnitronix Printmaster/+G interface also includes semi-translation PETASCII to ASCII for word processors (SA 6 and 11).

used two secondary addresses, 0 and 7. The 0 called the mode for uppercase and graphics, and the 7 referred to the mode for upper/lowercase and Commodore key graphics. This is similar to the way you can change your screen display to either of these modes by simultaneously pressing the shift and Commodore keys. Because Commodore printers and most interfaces can now do a lot more, they use many additional secondary addresses, with which you should become familiar.

Many interfaces offer you special character fonts and the chance to replace Commodore graphics symbols with descriptive text for more readable program listings (for example, printing {CLR} instead of a reversed heart symbol). All of these special presentation formats are

called by the proper secondary address.

A secondary address can also determine whether a line feed will be sent with a carriage return. There is actually a use for this.

I have an Epson-compatible printer (a Mannesmann-Tally Spirit 80 with a Tymac Connection interface), and its graphics characters are narrower than its regular letters and text. If I want to mix graphics and text together on the same line (for instance, text inside a box on a business form), I will first make the box edges, using whatever extra spaces I need to make it the correct size. Next, I will send a carriage return code (with no line feed), then print the text inside the box. When finished, I'll send a line-feed command:

```
PRINT#3,CHR$(10)
```

If I don't use this method, the vertical lines that form the side edges of the box will not line up.

Most interfaces have dip switches that must be set for Commodore Emulate mode or Transparent mode. Most of you have found the Emulate mode by now (and are probably afraid to leave it). Transparent mode often prints pure garbage because your interface doesn't change the PETASCII in this mode; it passes it unchanged to the printer. You'll know if you're in Transparent mode if your upper- and lowercase letters are swapped on your printout.

Sometimes you have to use Transparent mode. Some commercial software, especially word processors and some sophisticated printing programs, send out true ASCII, and for that you must be in Transparent mode. Also, if you are writing your own programs, it is much easier to send printer control codes if you are in Transparent mode.

Both interfaces and printers have dip switches for sending carriage returns with or without line feeds. Normally, it is better to set the printer for no line feeds, and the interface for line feeds. This is because it's usually easier to change dip-switch settings on the interface than on the printer, if one of your programs later requires a change in switch settings.

The other dip-switch settings on the interface are usually set in certain patterns, depending on your type of printer. (You can find the settings in your interface manual.) Once those dip switches are properly set, other functions of your interface can be controlled through the secondary address selected.

Printer Control Codes

Printer control codes are used to control printer operation and output on the fly. They allow you to access all those extra functions that your printer can perform: underlining; bold, condensed, expanded, double-strike and near-letter-quality type; superscript and subscript printing; line feed and form feed; italics; special character fonts; and many other features. Control codes often let you change print styles in the middle of a line.

As you recall, I said that standard ASCII had provision for 128 codes and characters. The first of these (0 to 31) were reserved for the control codes that were in use when ASCII was developed, with a few blanks for future use. Today, printers use the full eight-bit byte.

Various manufacturers have taken the additional 128 codes made available and assigned them values of their own (just as Commodore did). They have added graphics symbols and international characters and have also duplicated characters already available in the 128 values of the standard ASCII table.

Unfortunately, the values selected by the printer manufacturers don't match PETASCII or, for that matter, even each other. It is unlikely that there will ever be a full 256-character standard ASCII, so we won't even worry about it. Each printer manufacturer has its own standard, and many of these duplicate an Epson standard. (Since Epson was one of the first popular printers, many late-comers to the printer field use the same expanded ASCII as Epson. In this way, Epson has become a standard of sorts, though many companies, including Commodore, do not follow it.)

As printers became more advanced, there clearly weren't enough control codes available in the 32 codes set aside in the ASCII table. To be able to use all the new printer functions, printers use the ASCII character for ESC, which is CHR$(27). When the printer receives a CHR$(27), it knows that the next character or group of characters sent will not be ASCII, but printer control code. Sending that extra byte gives you another 256 values that can be assigned for operational control of the printer.

So, you can just send a CHR$(27) followed by the control codes, and everything will work fine, right? Well, if you've tried this, you know that it doesn't always work, especially when your interface is set in the Emulate mode. On the Commodore 1525 printers, CHR$(27) is used for dot-position printing, so when your interface is emulating the 1525 printer, it interprets the CHR$(27) command as an attempt to start dot-position printing.

On most interfaces, however, it is still possible to send printer control codes when in the Emulate mode by sending *two* CHR$(27) codes with the typical command:

```
PRINT#3,CHR$(27)CHR$(27)CHR$(x);
```

where x is your control code number. If you don't include the semicolon at the end of this command, a line feed will also be sent. Note, too, that it is not necessary to have a semicolon between CHR$( ) instructions or string variables. The preceding command will work, but it takes up a lot of space in your listing, especially if you want to send several control codes.

You can shorten this by setting a variable to CHR$(27), such as C$ = CHR$(27). Then use:

```
PRINT#3,C$C$CHR$(x);
```

(Note the use of, and lack of, the semicolon.) Similarly, you can shorten this still further by assigning variable names at the beginning of your program for each control code you're going to use. For instance, examine this short sample program:

```
10 LF$ = CHR$(10):REM LINEFEED
20 C$ = CHR$(27):REM ESC CODE
30 IT$ = CHR$(52):REM ITALICS ON
40 IO$ = CHR$(53):REM ITALICS OFF
50 DW$ = CHR$(14):REM DOUBLE WIDTH
60 NP$ = CHR$(20):REM DOUBLE WIDTH OFF
70 OPEN3,4,0:REM 0 SA SETS UPPERCASE & GRAPHICS
   W/LINEFEEDS
80 PRINT#3,"NORMAL PRINT FOLLOWED BY 2 BLANK
   LINES"LF$LF$
90 PRINT#3,C$C$IT$"ITALICS AND ONE BLANK LINE"LF$
100 PRINT#3,C$C$DW$"DOUBLE SIZE ITALICS AND 2 BLANK
    LINES"LF$LF$
```

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PRINTER CONTROL CODES

Printer: / Function:	Commodore 1525 & MPS-803	Commodore 1526 & MPS-802	Commodore MPS1000 Serial Commodore mode	Commodore MPS1000 Parallel IBM mode
Local Comm. crsr up upr case & graphics	145	145	145	N/A
Local Comm. crsr down upr/lwr case	17	17	17	N/A
Prgm bit-image graphics	8	N/A	8	N/A
Linefeed	10	10	10	10
Carr.retrn w/linefeed	13	13	13	13
CR w/out linefeed	N/A	141	141	DIP switch
Dbl-wide Characters	14	14	14	14
Double-wide off & normal PICA print	15	129	15	20
Tab set printhead	16,n,m	SA format	16,n,m	N/A
Reverse char. print	18	18	18	N/A
Reverse print off	146	146	146	N/A
Dot-position print	27,16,n,m	N/A	27,16,n,m	N/A
Repeat graphics	26,n,data	N/A	26,n,data	N/A
Print prgmd char, set up with SA = 5	N/A	254	254	N/A
Paging on	N/A	147	147	N/A
Paging off		19	19	
Skip spaces	N/A	29	29	N/A
Pad string w/spaces		160	160	
BIT IMAGE GRAPHICS				
Single density				75,n1,n2
Double density				76,n1,n2
Dbl. dens, hi-speed	N/A	N/A	N/A	89
Quadruple density				90,n1,n2
Master graphics				N/A
Near letter quality ON	N/A	N/A	31	120,1
OFF			159	120,0
Terminate TABS	N/A	N/A	N/A	0
Sound beeper/bell	N/A	N/A	N/A	7
Backspace	N/A	N/A	N/A	N/A
Horizontal TAB	N/A	N/A	N/A	9
Vertical TAB	N/A	N/A	N/A	11
Form Feed	N/A	N/A	N/A	12
Condensed Print ON	N/A	N/A	N/A	15
OFF				18
Clear print buffer	N/A	N/A	N/A	24
CONTROL CODE ESC	N/A	N/A	N/A	27
MACRO define				
select	N/A	N/A	N/A	N/A
end				
Eighth bit as is				
Set to 0	N/A	N/A	N/A	N/A
Set to 1				
Download char. set ON				
OFF	N/A	N/A	N/A	N/A
Copy ROM to RAM				
Define				
Underline ON	N/A	N/A	N/A	45,1
OFF				45,0
Set linefeeds 1/6"	Normal	Normal	Normal	Normal
1/8"	8	w/SA = 6	w/SA = 6	48
7/72"	N/A	w/SA = 6	w/SA = 6	49
n/72"	N/A	w/SA = 6	w/SA = 6	65,n
n/144"	N/A	w/SA = 6	w/SA = 6	N/A
n/216"	N/A	N/A	w/SA = 6	51,n
Prev. definition	N/A	N/A	N/A	50

Star Gemini 10X/15X	Star SG 10/15 Star mode	Star SG 10/15 IBM mode	Selkosha SP 1000	Panasonic KX-P1091	Mannesmann Tally Spirit-80	Okidata 120	Okimate 10
N/A	N/A	N/A	N/A	N/A	N/A	145	145
N/A	N/A	N/A	N/A	N/A	N/A	17	17
N/A	N/A	N/A	N/A	N/A	N/A	8	8
10	10	10	10/11	10	10/11	10	10
13	13	13	13	13	13	13	13
DIP switch	DIP switch	DIP switch	60	60	DIP switch	141	N/A
14	14	14	14	14	14	14	15,14
20	20	20	20	20	20	129	15
66,1	66,1	80	80	80		15	
N/A	N/A	N/A	N/A	N/A	N/A	16,n,m	16,n,m
N/A	N/A	N/A	N/A	N/A	N/A	18	18
N/A	N/A	N/A	N/A	N/A	N/A	146	146
N/A	N/A	N/A	N/A	N/A	N/A	27,16,n,m	27,16,n,m
N/A	N/A	N/A	N/A	N/A	N/A	26,n,data	26,n,data
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
75,n1,n2	75,n1,n2	75,n1,n2	75,n1,n2	75,n1,n2	75,n1,n2	80	
76,n1,n2	76,n1,n2	76,n1,n2	76,n1,n2	76,n1,n2	76,n1,n2	81	
121,n1,n2	121,n1,n2	89,n1,n2	89,n1,n2	89,n1,n2	N/A	N/A	N/A
122,n1,n2	122,n1,n2	90,n1,n2	90,n1,n2	90,n1,n2	N/A	N/A	
N/A	63,n	42,m,n1,n2	42,m,n1,n2	42,m,n1,n2	N/A	N/A	
N/A	66,4	52	120,1	110	N/A		
	66,5	53	120,0	80		N/A	N/A
0	0	0	0	0	0	N/A	N/A
7	7	7	7	7	7	N/A	N/A
8	8	8	8	8	8	N/A	N/A
9	9	9	9	9	9	N/A	N/A
11	11	11	N/A	11	N/A	N/A	N/A
12	12	12	12	12	12	12	12
15/66,3	15/66,3	15	15	15	15	29	29
18	18	18	18	18	18	15	15
N/A	24	24	24	24	N/A	N/A	N/A
27	27	27	27	27	27	27	27
43,....30	43,....30						
33	33	63	N/A	N/A	N/A	N/A	N/A
30	30						
35	35	35		35	35		
61	61	61	N/A	61	61	N/A	N/A
62	62	62		62	62		
36,1	36,1	37,10		By define			
36,0	36,0	37,00	N/A	122	N/A	N/A	N/A
42,0	42,0	58,000		N/A			
42,1,n1,n2..	42,1,n1,n2..	38,0,n1,n2..		121,L,data		N/A	N/A
45,1	45,1	45,1	45,1	45,1	45,1	67	N/A
45,0	45,0	45,0	45,0	45,0	45,0	68	
50	50	50	50	50	50	54	Normal
48	48	48	48	48	48	56	8
49	49	49	49	49	49	N/A	N/A
65,n	65,n	65,n	65,n	65,n	65,n	N/A	N/A
51,n	51,n	N/A	N/A	N/A	N/A	27,10,n	27,10,n
N/A	N/A	51,n	51,n	51,n	51,n	N/A	N/A
N/A	N/A	50	50	N/A	N/A	N/A	N/A

Function: / Printer:	Commodore 1525 & MPS-803	Commodore 1526 & MPS-802	Commodore MPS1000 Serial Commodore mode	Commodore MPS1000 Parallel IBM mode
Auto linefeed ON	N/A	N/A	N/A	53,1
OFF				53,0
IBM char. Set 1	N/A	N/A	N/A	55
IBM char. Set 2				54
Paper out disable	N/A	N/A	N/A	56
enable				57
ELITE type 12 cpi	N/A	N/A	N/A	58
Unidirectional print				
ON	N/A	N/A	N/A	85,1
OFF				85,0
Reset printer	N/A	N/A	N/A	64
Set vertical TABS	N/A	N/A	N/A	66,n1,n2...0
Clear vertical TABS				66,0
Form n lines	N/A	N/A	N/A	67,n
Length n inches				67,0n
Set horiz. TABS	N/A	N/A	N/A	68,n1,n2,...
Clear horiz. TABS				68,0
Emphasized print ON	N/A	N/A	N/A	69
OFF				70
Double strike ON	N/A	N/A	N/A	71
OFF				72
One time functions				
1X linefeed n/144	N/A			N/A
1X linefeed n/216	N/A	N/A	N/A	74,n
Vert. feed n lines				N/A
Horiz. TAB n columns				N/A
Unidirectional line				60
Skip over n lines	N/A	N/A	N/A	78,n
Perforations OFF				79
TABS to default	N/A	N/A	N/A	82
Superscript ON				83,0
Subscript ON	N/A	N/A	N/A	83,1
Script modes OFF				84
Dbl-width Lock ON	14	14	14	87,1
OFF	15	15	15	87,0
Set column width				N/A
Set left/right margins				88,lm,r m
Set right margin	N/A	N/A	N/A	above
Set left margin				above
Top margin n lines				N/A
Italics ON	N/A	N/A	N/A	N/A
OFF				
Intn'l char. sets	N/A	N/A	N/A	N/A
Buzzer enable	N/A	N/A	N/A	N/A
disable				
Print zero w/slash	N/A	N/A	N/A	N/A
w/out slash				
Proportional spacing ON	N/A	N/A	N/A	N/A
OFF				
Delete last char.	N/A	N/A	N/A	N/A
1/2 speed print ON	N/A	N/A	N/A	N/A
OFF				
Skip n spaces on line	N/A	N/A	N/A	N/A
Skip n lines				
Set vert. TAB n lines	N/A	N/A	N/A	N/A
Set horiz. TAB n Spaces				
Align color ribbon	N/A	N/A	N/A	N/A

Star Gemini 10X/15X	Star SG 10/15 Star mode	Star SG 10/15 IBM mode	Selkosha SP 1000	Panasonic KX-P1091	Mannesmann Tally Spirit-80	Okidata 120	Okimate 10
DIP switch	DIP switch	DIP switch	DIP switch	DIP switch	DIP switch	N/A	N/A
N/A	N/A	55	55	55	N/A	N/A	N/A
		54	54	54			
56	56	56	56	56	56	69,1	N/A
57	57	57	57	57	57	69,0	
66,2	66,2	77	77	77	N/A	28	N/A
85,1	85,1	85,1	85,1	85,1	85,1	N/A	N/A
85,0	85,0	85,0	85,0	85,0	85,0		
64	64	64	64	64	64	24	N/A
80,n1,n2..0	80,n1,n2..0	66,n1,n2...0	N/A	66,n1,n2...0	66,n1,n2...0	N/A	N/A
80,0	80,0	66,0		66,0	66,0		
67,n	67,n	67,n	67,n	67,n	67,n	70,n	N/A
67,0n	67,0n	67,0n	67,0n	67,0n	67,0n	N/A	
68,n1,n2,...	68,n1,n2,...	68,n1,n2,...	68,n1,n2,...	68,n1,n2,...	68,n1,n2,...	N/A	N/A
68,0	68,0	68,0	68,0	68,0	68,0		
69	69	69	69	69	69	84	N/A
70	70	70	70	70	70	73	
71	71	71	71	71	71	72	N/A
72	72	72	72	72	72	73	
74,n	74,n	N/A	N/A	N/A	N/A		
N/A	N/A	74,n	74,n	74,n	74,n	N/A	N/A
97,n	97,n	97,n	N/A	N/A	N/A		
98,n	98,n	98,n	N/A	N/A	N/A		
N/A	60	60	N/A	N/A	60		
78,n	78,n	78,n	78,n	78,n	78,n	27,65	27,65
79	79	79	79	79	79	66	66
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
83,0	83,0	83,0	83,0	83,0	83,0	74	
83,1	83,1	83,1	83,1	83,1	83,1	76	N/A
84	84	84	84	84	84/72	75/77	
87,1	87,1	87,1	87,1	87,1	87,1	14	14
87,0	87,0	87,0	87,0	87,0	87,0	15	15
N/A	N/A	N/A	N/A	N/A	81,n		
N/A	N/A	N/A	N/A	N/A	N/A		
81,n	81,n	81,n	81,n	81,n	N/A	N/A	N/A
77,n	77,n	108,n	108,n	108,n	N/A		
82,n	82,n	114,n	N/A	N/A	N/A		
52	52	73,1	52	52/54	52	N/A	N/A
53	53	73,0	53	53/55	53		
55,n	55,n	82,n	N/A	82,n	82,n	33,66 or 67	N/A
89,1	89,1	121,1	N/A	N/A	N/A	N/A	N/A
89,0	89,0	121,0					
N/A	92,1	92,1	N/A	N/A	N/A	33,64	N/A
	92,0	92,0				33,65	
N/A	112,1	112,1	112,1	N/A	N/A	N/A	N/A
	112,0	112,0	112,0				
127	N/A	N/A	N/A	127	127	N/A	N/A
N/A	N/A	N/A	N/A	73,1	N/A	N/A	N/A
				73,0			
N/A	N/A	N/A	N/A	102,0,n	N/A	N/A	N/A
				102,1,n			
N/A	N/A	N/A	N/A	101,1,n	N/A	N/A	N/A
				101,0,n			
N/A	N/A	N/A	N/A	N/A	N/A	N/A	27,25

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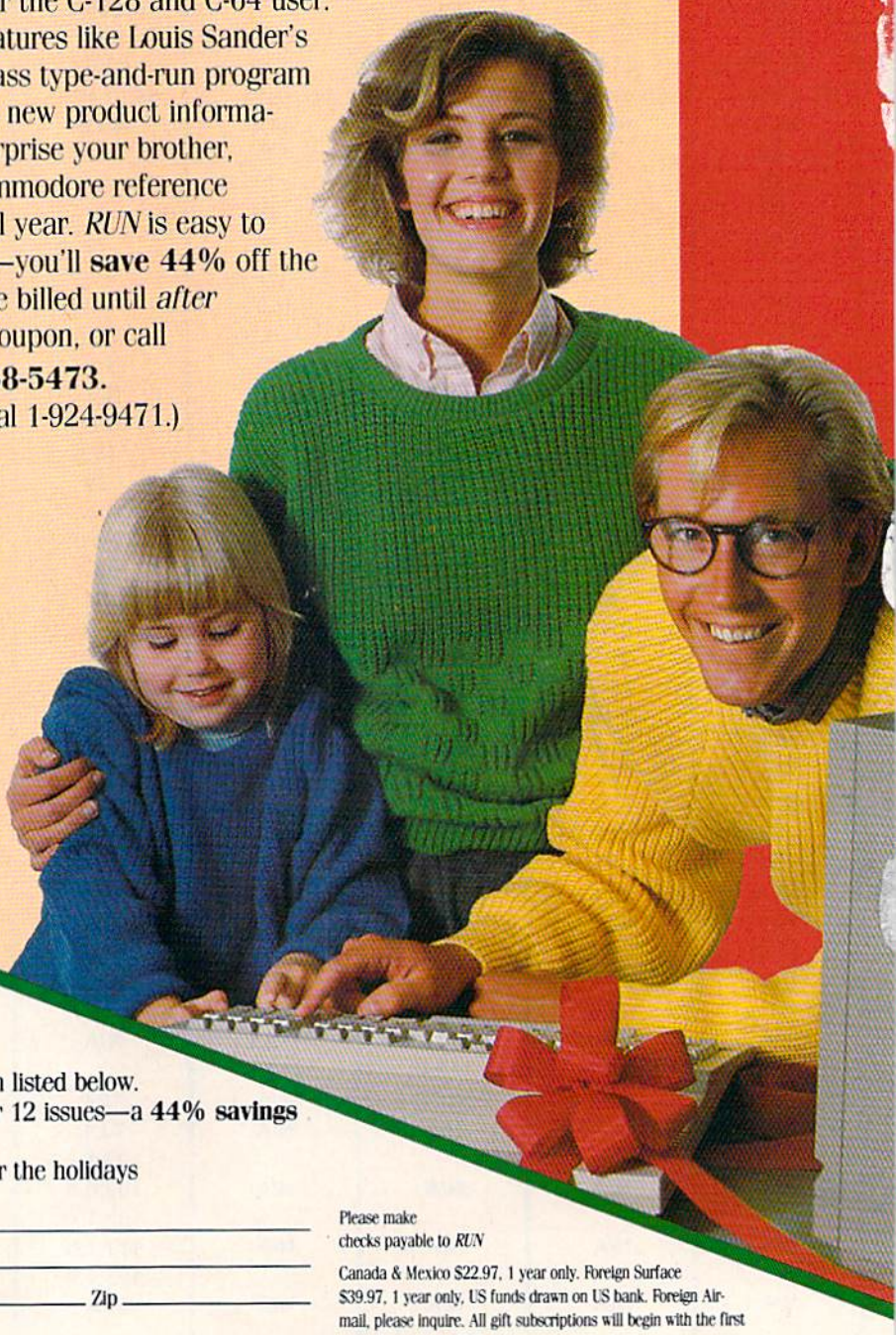

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```
110 PRINT#3,C$C$IO$"DOUBLE SIZE NORMAL AND 1 BLANK
    LINE"LF$
120 PRINT#3,C$C$NP$"NORMAL PRINTING AGAIN"
130 PRINT#3:CLOSE3
```

Note that the LF$ is not preceded by CC. The CHR$(10) code (and also the CHR$(13) code for carriage return) is recognized by the 1525 (and by your interface in Emulate mode) and doesn't require a CHR$(27).

There is a final trick that I find even easier to use. Open two printer files at the same time, one in Emulate mode for normal printing of text, and the other file in Transparent mode for sending control codes. Using the preceding program, make the following modifications:

```
70 OPEN3,4,0:OPEN4,4,6:REM ON MY INTERFACE, 6 IS THE SA
   FOR TRANSPARENT MODE
80 PRINT#3,"NORMAL PRINT FOLLOWED BY 2 BLANK
   LINES"LF$LF$
85 PRINT#4,C$IT$;
90 PRINT#3,"ITALICS AND ONE BLANK LINE"LF$
95 PRINT#4,C$DW$;
100 PRINT#3,"DOUBLE SIZE ITALICS AND 2 BLANK
    LINES"LF$LF$
105 PRINT#4,C$IO$C$DW$;
110 PRINT#3,"DOUBLE SIZE NORMAL AND 1 BLANK LINE"LF$
115 PRINT#4,C$NP$;
120 PRINT#3,"NORMAL PRINTING AGAIN"
130 PRINT#3:CLOSE3:CLOSE4
```

The main advantages to this method are that only one CHR$(27) is required, and if you have trouble on the printout with the wrong control code instruction, you only have to look at the PRINT#4 statements. If the problem is with text, you only look at the PRINT#3 statements.

Another point to remember about control codes is that you sometimes have to send parameters after them. These parameters usually select an option that's available with a control code. For instance, on my printer, the command (in Transparent mode) to underline text is:

```
PRINT#4,CHR$(27)CHR$(45)CHR$(0);
```

To turn it off, I would use:

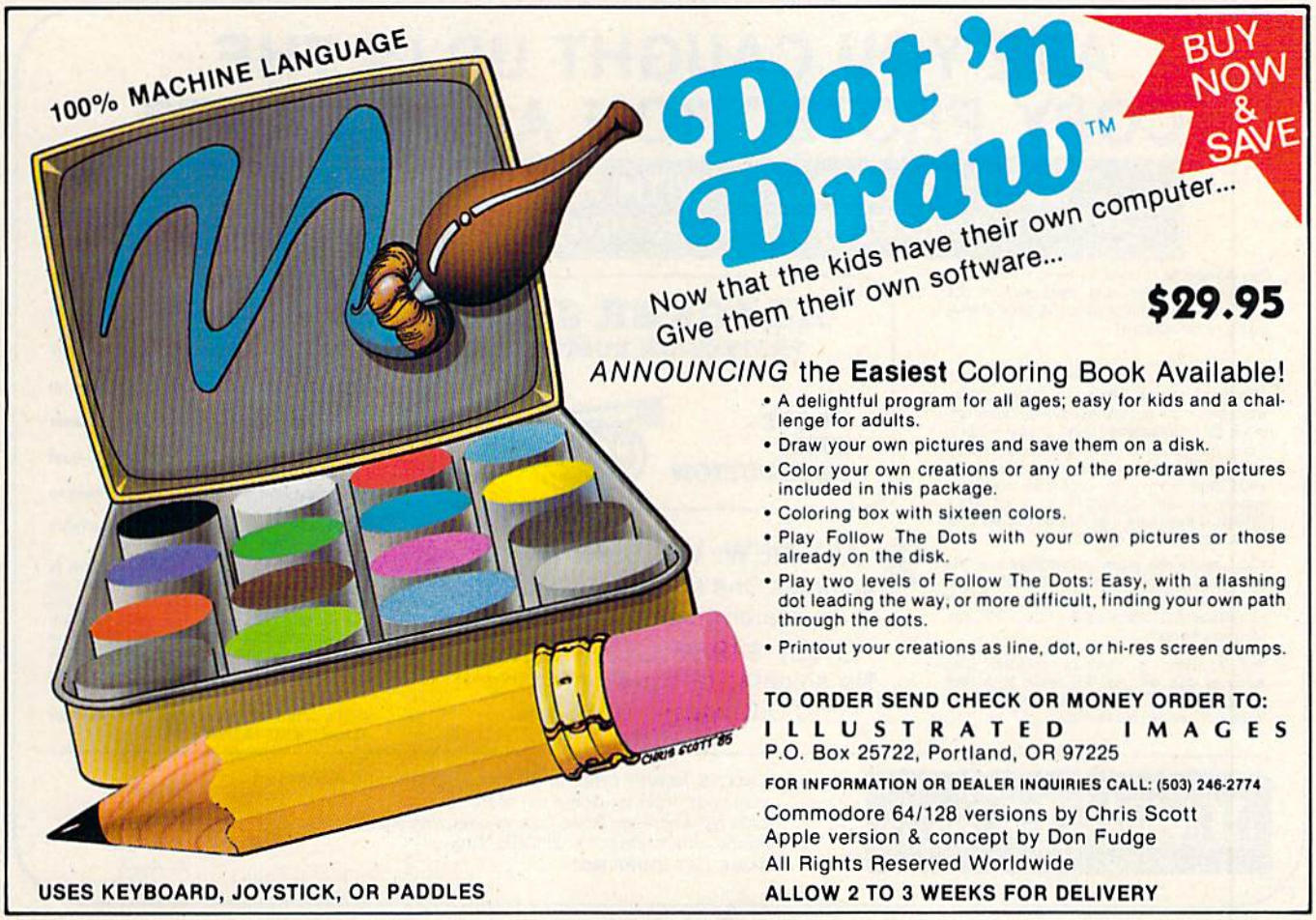
```
PRINT#4,CHR$(27)CHR$(45)CHR$(1);
```

The 1 and the 0 are additional parameters used with the control code 45.

Besides the CHR$ format, there is another way to represent and send control codes. You can send the actual character that the CHR$ represents, but it must be enclosed within quotation marks. For instance, in the preceding example, CHR$(45) represents the minus sign (–) in the ASCII table. Therefore, the command to turn off the underlining could have been:

```
PRINT#4,CHR$(27)"-"CHR$(1);
```

In your printer manual's control-code tables, in addition to the decimal values for control codes, you will find characters and symbols that, when sent within quotation marks, will do the same as the decimal number sent as a CHR$. Note that this will not work for CHR$(27), which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is used to get the printer's attention. For instance, you can send a line feed with the command:

```
PRINT#4,CHR$(27)"LF";
```

Now that you know how secondary addresses and control codes can be used in your own programs, let's take a look at how you can get your commercial word processing software to use your printer's fine features.

Using Commercial Software

The manual that accompanies a commercial word processor usually states that it supports such things as underlining, double-width printing and other goodies. You follow the directions as best you can, but when you print it out, it doesn't appear as you intended. You may play with the interface and find a combination that sort of works, but usually you compromise by giving up some of the advanced printer features. I can't tell you how to solve every problem, since you are all using so many different programs, interfaces, printers, and combinations thereof. But I can tell you a few things to look for and try.

Some programs give you a list of printer options. In such cases, select your printer and set your interface to Transparent mode. Also check to see whether or not you should select line feeds on the interface. A sample printout will tell you that. If it is double-spaced, set the dip switch on the interface for no line feeds. If your printer overstrikes all characters on one line, select line feeds. If your printer is not listed, select a similar printer. Similar printers are grouped as follows:

1. Epson, Gemini, Riteman, Panasonic and Mannesmann Tally
2. Prowriter, C. Itoh and NEC
3. Okidata Microline
4. Seikosha and Gorilla Banana
5. Commodore and others with a built-in Commodore-emulation interface

Also, bear in mind that your word processor may let you display the Commodore graphics that are available with the Commodore key, but may not print them out when you're in Transparent mode. If you want to use these graphics, you may have to do a trade-off here and use the Commodore Emulate mode on the interface.

Other word processors expect a Commodore-type printer, but allow you to set up special characters that can be defined as printer-control codes. The program will usually send one CHR$(27) when it sends the control code. You may have to define one of the characters as CHR$(27) and use it in conjunction with the other control codes you define. This way, the program ends up sending two CHR$(27) characters, which your interface will need when it is in the Emulate mode.

So, there will still be some work involved to get your word processor or other programs running. I hope I've given you enough background to make an educated, rather than a haphazard, approach to the problem. ■

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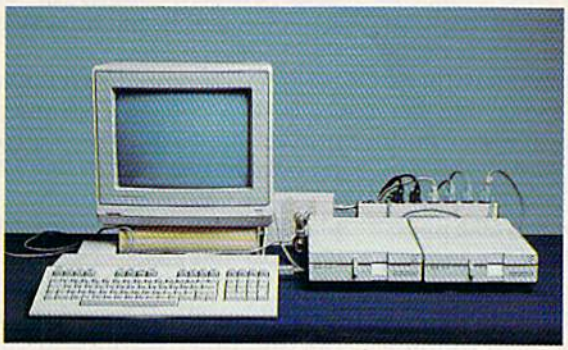

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By MARK RASMUSSEN

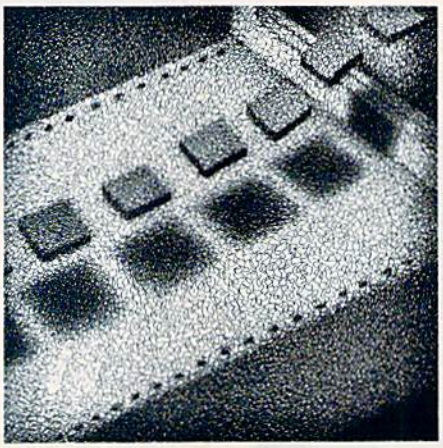
Screen Dump is a program I wrote to print out hard copies of lo-res and text screen displays when I'm using other programs. It's relocatable in memory, so it won't disturb most other Basic programs. Once you've loaded Screen Dump, it's there to use—all you have to do is press control-P. Just be aware that Screen Dump doesn't work with hi-res or bit-mapped screens.

The program loads into the top of Basic memory, where it's protected from most operations of other Basic programs. It uses only a small percentage of the program space in memory, so you'll still have plenty of room for other programs.

When you are preparing to use Screen Dump, make it the *last* utility you load into your C-64. Load Listing 1 and run it, writing down the number that appears on the screen after it runs. SYSing to that address will enable and disable the program. After you've loaded and run Listing 1, load and run your Basic or machine language program. Now you can dump the screen to the printer by holding the control key down and typing P.

The Program

The Basic code in Screen Dump contains an instruction section and the data for the machine language routine. The unique part of the Basic code is the relocator that changes several locations in the machine language routine and lets you use Screen Dump with other utilities (like meta-Basic) that also reside at the top of memory. You can run Screen Dump



several times, and each time it'll be stored in a different memory location. When you press control-P, the locations will each print a screen, in consecutive order.

Screen Dump "hooks" into the memory area of the operating system that handles interrupt requests (IRQs)—60 or more of which occur every second. During an interrupt request, Screen Dump's machine language routine checks to see if both the control key and the P key are pressed at the same time. If they are, one or more screen dumps take place. If not, the interrupt handler goes on as usual.

The advantage of this technique is that the IRQs are generated continuously, whether you're in Basic Immediate or Programming mode or executing a machine language routine. That means Screen Dump will work any time until it's disabled or overwritten by another program. Some machine language programs and Basic programs will overwrite Screen Dump, so any time you plan to use Screen Dump, be sure to test it with the other program first.

Making Changes

Screen Dump performs the equivalent of OPEN 30,4,sa, where sa (secondary address) is omitted if you're in Uppercase/Graphics mode or is 7 if you're in Upper-/Lowercase mode. Accordingly, file number 30 should not be open if you are going to use Screen Dump.

You can change the numbers in the Open statement easily. The file number (30) is located in the variable BA in line 1400. You get the device number (4) by adding 70 to the value of BA, the secondary address for Uppercase/Graphics by adding 58, and the secondary address for Upper-/Lowercase by adding 65. You can change these locations either in the Data statements or in the lines that follow line 1400.

Screen Dump doesn't send linefeeds with carriage returns. If your printer dumps the screen on one line, replace the two 234s in line 1330 with 169 and 010, respectively. Then replace the three 234s in line 1340 with 032, 210 and 255.

My technique for hooking the interrupt handler is easy to use, and you can add other features to your C-64 with it as well. Having a relocatable utility is handy, because it enables you to store more than one wedge in memory at the same time. ®

Address all author correspondence to Mark Rasmussen, 2142 8th Ave. NE, Owatonna, MN 55060.

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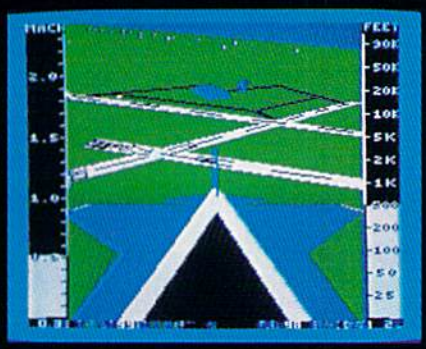

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Listing 1. *Screen Dump program.*

```
1000 REM SCREEN DUMP BY M. RASMUSSEN
                                        :REM*101
1020 PRINTCHR$(14)"{SHFT CLR}{2 CRSR DNs}{C
     TRL 2}{SHFT T}HIS PROGRAM WILL TRANSFE
     R                                  :REM*25
1030 PRINT"WHATEVER IS PRINTED ON THE SCREE
     N TO"                              :REM*158
1040 PRINT"YOUR PRINTER. {SHFT A}LL YOU HAV
     E TO DO IS"                        :REM*152
1050 PRINT"TYPE {CTRL 9}<{SHFT C}{SHFT T}{S
     HFT R}{SHFT L}> {SHFT P}{CTRL 0} IN TH
     E IMMEDIATE MODE."                 :REM*76
1060 PRINT"{SHFT P}RINTING CAN BE PERFORMED
      WITHOUT "                         :REM*132
1070 PRINT"INTERFERING WITH THE RUNNING OF"
                                        :REM*0
1080 PRINT"SOME PROGRAMS.{CRSR DN}"  :REM*8
1090 DATA 120,173,020,003,072,173,031,159
                                        :REM*102
1100 DATA 141,020,003,104,141,031,159,173
                                        :REM*54
1110 DATA 021,003,072,173,032,159,141,021
                                        :REM*112
1120 DATA 003,104,141,032,159,088,096,033
                                        :REM*198
1130 DATA 159,173,141,002,041,004,240,006
                                        :REM*196
1140 DATA 165,197,201,041,240,003,108,031
                                        :REM*210
1150 DATA 159,032,000,159,169,000,032,189
                                        :REM*78
1160 DATA 255,169,255,172,024,208,192,021
                                        :REM*92
1170 DATA 240,002,169,007,168,162,004,169
                                        :REM*172
1180 DATA 030,032,186,255,032,192,255,032
                                        :REM*86
1190 DATA 183,255,208,080,162,030,032,201
                                        :REM*252
1200 DATA 255,032,183,255,208,070,169,025
                                        :REM*132
1210 DATA 133,251,169,000,133,254,133,252
                                        :REM*84
1220 DATA 169,004,133,253,177,252,141,167
                                        :REM*126
1230 DATA 002,041,127,141,168,002,041,032
                                        :REM*154
1240 DATA 208,009,173,168,002,024,105,064
                                        :REM*140
1250 DATA 141,168,002,173,167,002,041,064
                                        :REM*138
1260 DATA 240,009,173,168,002,024,105,064
                                        :REM*222
1270 DATA 141,168,002,162,018,173,167,002
                                        :REM*204
1280 DATA 048,012,138,009,128,170,165,254
                                        :REM*129
1290 DATA 208,008,240,016,208,060,165,254
                                        :REM*221
1300 DATA 208,010,138,032,210,255,169,255
                                        :REM*91
1310 DATA 069,254,133,254,173,168,002,032
                                        :REM*49
1320 DATA 210,255,200,192,040,208,173,160
                                        :REM*203
1330 DATA 000,169,013,032,210,255,234,234
                                        :REM*101
1340 DATA 234,234,234,198,251,240,019,024
                                        :REM*73
1350 DATA 165,252,105,040,133,252,165,253
                                        :REM*227
1360 DATA 105,000,133,253,169,000,133,254
                                        :REM*243
1370 DATA 240,138,169,030,032,195,255,032
                                        :REM*251
1380 DATA 204,255,032,000,159,108,031,159
                                        :REM*139
1390 PRINT"{CRSR DN}{SHFT L}OADING {SHFT S}
     CREEN {SHFT D}UMP, PLEASE WAIT..."
                                        :REM*59
1400 MT=256*PEEK(56)+PEEK(55):BA=MT-240
                                        :REM*9
1410 FOR J=BA TO BA+239:READ T:POKE J,T:NEX
     T                                  :REM*55
1420 REM FIX ADDRESSES                  :REM*93
1430 J=BA+6:T=BA+31:GOSUB 1570:POKE J,TL:PO
     KE J+1,TH                          :REM*131
1440 J=BA+13:POKE J,TL:POKE J+1,TH :REM*135
1450 J=BA+47:POKE J,TL:POKE J+1,TH  :REM*23
1460 J=BA+238:POKE J,TL:POKE J+1,TH:REM*245
1470 J=BA+20:T=BA+32:GOSUB 1570:POKE J,TL:P
     OKE J+1,TH                         :REM*241
1480 J=BA+27:POKE J,TL:POKE J+1,TH  :REM*53
1490 J=BA+31:T=BA+33:GOSUB 1570:POKE J,TL:P
     OKE J+1,TH                         :REM*137
1500 J=BA+50:T=BA:GOSUB 1570:POKE J,TL:POKE
      J+1,TH                            :REM*101
1510 J=BA+235:POKE J,TL:POKE J+1,TH :REM*33
1520 J=51:POKE J,TL:POKE J+1,TH     :REM*123
1530 J=55:POKE J,TL:POKE J+1,TH       :REM*5
1540 SYS (BA):PRINT"{CRSR DN}{SHFT S}{SHFT
     C}{SHFT R}{2 SHFT Es}{SHFT N} {SHFT D}
     {SHFT U}{SHFT M}{SHFT P} READY. {SHFT
     T}O DISABLE OR"                    :REM*24
1550 PRINT"RE-ENABLE, TYPE:{2 CRSR DNs}"
                                        :REM*46
1560 PRINT"{11 SPACEs}{SHFT S}{SHFT Y}{SHFT
      S}"BA:END                         :REM*38
1570 TH=INT(T/256):TL=T-TH*256:RETURN
                                        :REM*78
```

■

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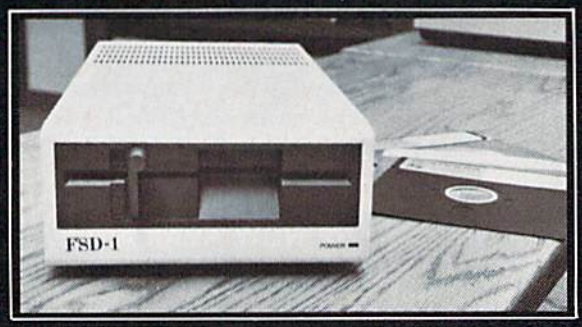

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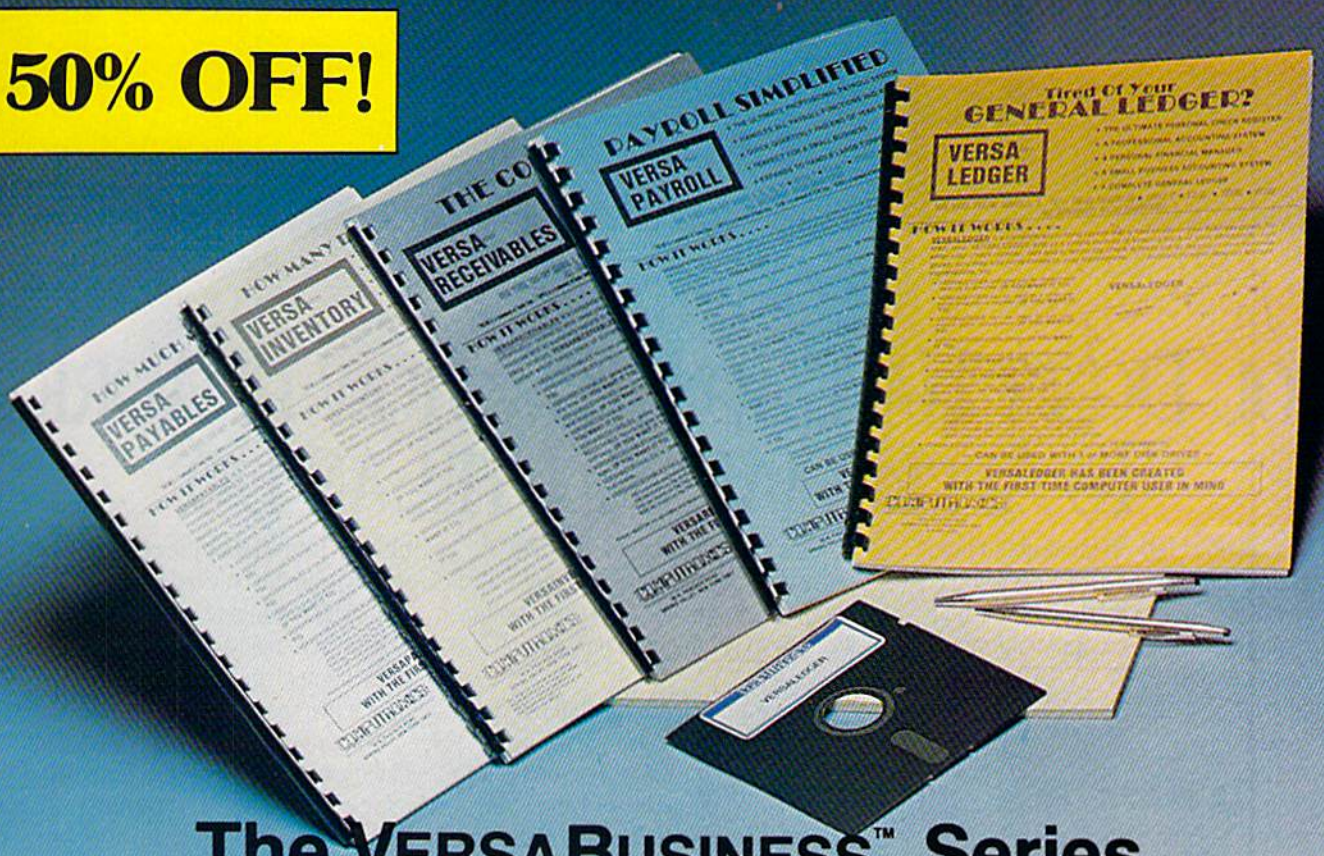

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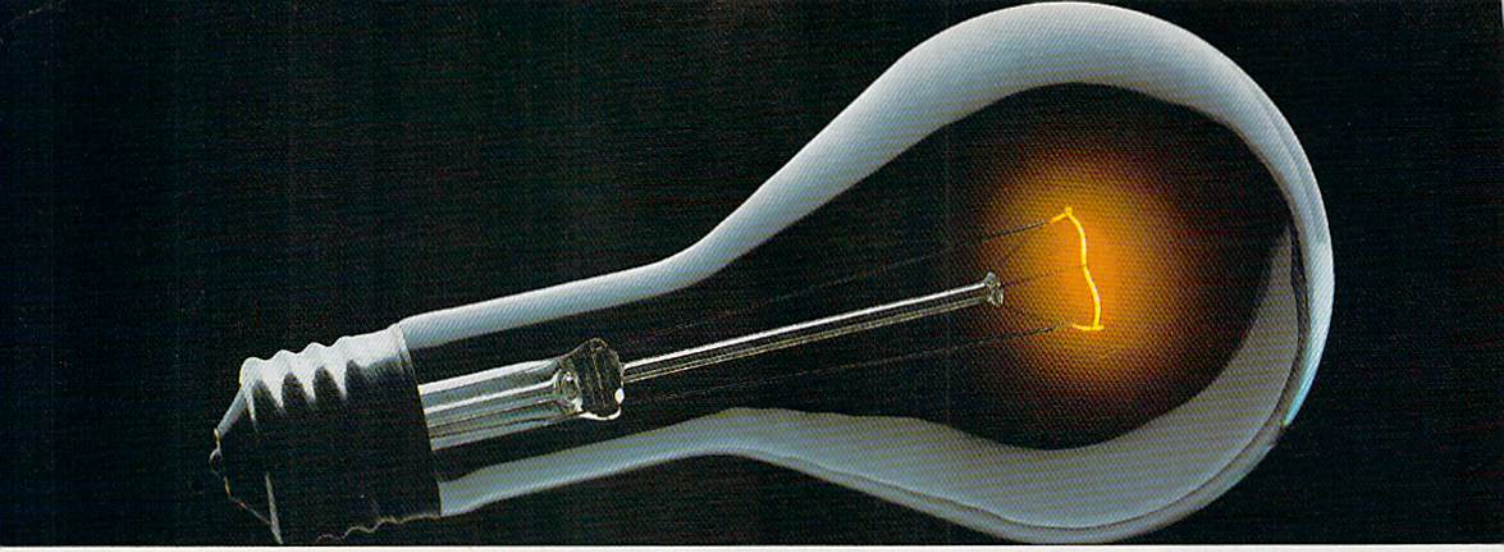

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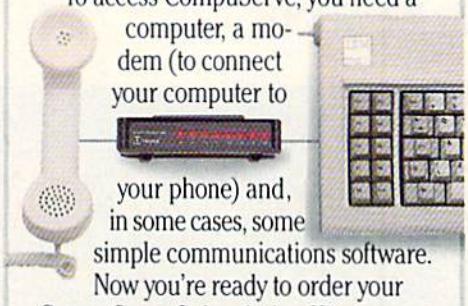

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DASHING OFF THE DOTS

Can you read this? .. .—.. ——— ...— . .—. ..— —. If not, you'll have fun learning with this Morse code tutor. If you're an experienced ham, this'll help you improve your speed.

By JOE NOVAK

Morse code has been around for a long time, an outgrowth of Samuel Morse's invention of the telegraph. It was instrumental in taming the West and in running the railroads, and is, of course, widely used by the armed forces, intelligence services and amateur radio operators around the world. A ham must, in addition to passing a test on electronic theory, be able to send and receive code to get a license.

If a ham license is your goal, Morse Code Tutor will help, but even if you're not interested in amateur radio, you can still have fun learning the code. Keep in mind, however, that practicing on a computer will never replace working with another person.

Morse Code Tutor (the C-64 version in Listing 1, the C-128 version in Listing 2) opens with a brief graphics display of code being sent from a naval ship. Then the Main menu appears. The first option is to view a code chart of the letters of the alphabet and numerals with their corresponding dot-and-dash ("dit" and "dah") codes. The other two options are for receiving and sending code.

If you proceed to the chart screen, you'll find another menu at the bottom of the display. From it you can go to the next chart screen (for a list of punctuation marks and other miscellaneous codes), review the audio code for each character as it's displayed, or return to the Main menu.

Receiving

If you choose the Receive menu, your choices are Random Characters, Library Message, Input Message or back to the Main menu. The first generates a random character (letter, numeral or punctuation mark) and simultaneously produces both audio and visual code for that character. The visual display is the ship again. When the prompt, a square arrangement of dots, appears, type in what you think the character was. The correct answer, with code, follows immediately. Then press any key to go to another character, or M to return to the Receive menu.

The library messages are a collection of sayings and other short blurbs that reside in a list of Data statements at the end of the program. When you choose the Library Message option on the Receive menu, one of this collection is output in code.

You can add to the collection or change the messages as you wish. Just remember that they can be no more than 255 characters long, a single X must always be the last Data statement, and if you use a comma, en-

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C-64; C-128

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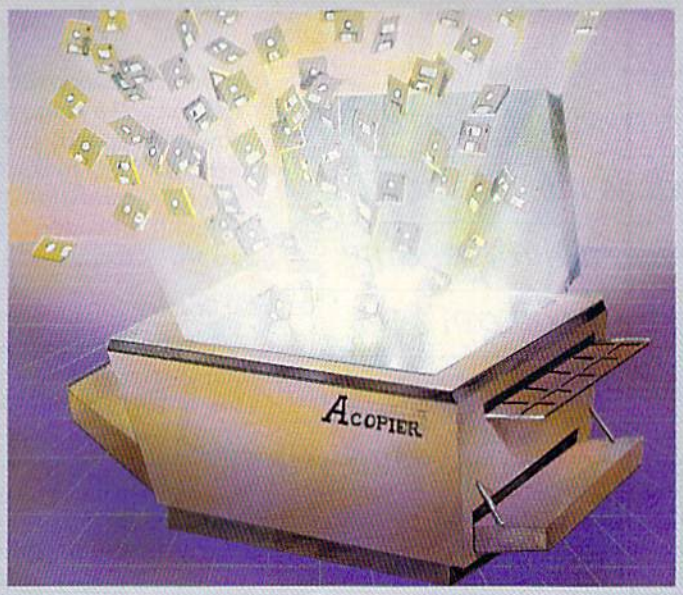

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Receiving Morse code is more difficult to learn than sending, because you can't work ahead.

close the entire message in quotes. Morse Code Tutor will encode anything except parentheses and the short messages that appear at the end of the code chart (End of Message, for instance).

When using the Library Message option, you have to set the speed, in words per minute, at which you want the message sent. Fifteen is the maximum the computer can handle.

The next Receive menu choice is Input Message, an opportunity for you to type in an impromptu message that will be output in code for yourself or a friend. Don't use the comma and keep the message short—less than 255 characters. Once again you must specify the sending speed. Press any key to start the code; then, when transmission is complete, the original uncoded message appears on the screen.

Sending

Meanwhile, back at the Main menu, the final choice is Sending. You can use any key to send your code to the computer. If a quarter of a second elapses before you press the key again, the character you've typed appears on the screen. If you delay half a second, the program makes a word space. That may sound fast, but after a little practice it'll seem just the opposite.

Work on pacing—keeping your keystrokes uniform and consistent. When the program displays an asterisk, you've sent a meaningless sequence that can't be decoded. Since receiving Morse code is more difficult to learn than sending, because you can't work ahead, keep your progress even by sending messages no faster than you can receive them.

If you're using the C-128 version of Morse Code Tutor and would like to send with the joystick fire-button rather than the keyboard, you have to change lines 720, 740 and 770 in the program. The replacement lines appear in Listing 3.

The C-128 version of the program is written with Basic 7.0 commands, and it will run in either 40- or 80-column mode. In programming the Sound statements, I used a musical note (D, fifth octave) to produce the clean tone, and I positioned text on the screen with the CHAR statement. The Fast command at the beginning of the program speeds up initialization to less than five seconds.

To encourage you to use Morse Code Tutor, I'll leave you with these final words:

.... .— ...— . ..—. ..— —.

When you've figured them out, you'll be on your way. ®

Address all author correspondence to Joe Novak, PO Box 9082, Boise, ID 83707.

Continued on p. 118.

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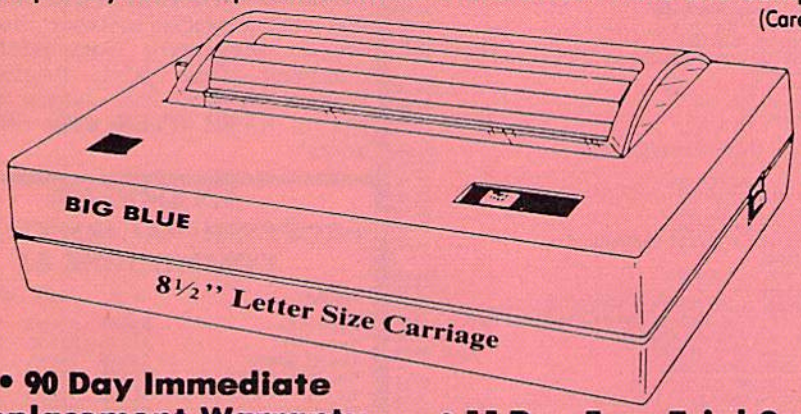

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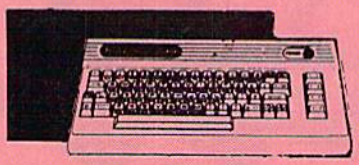

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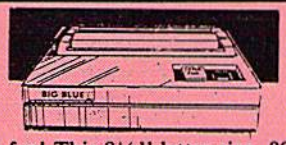

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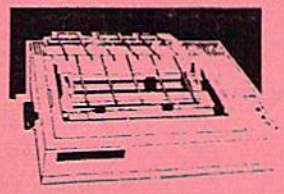

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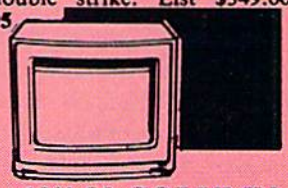

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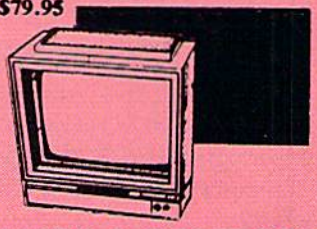

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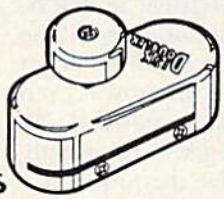

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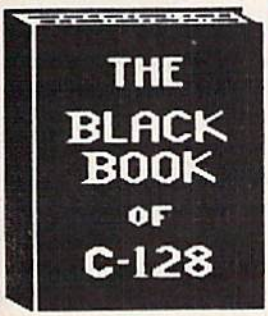

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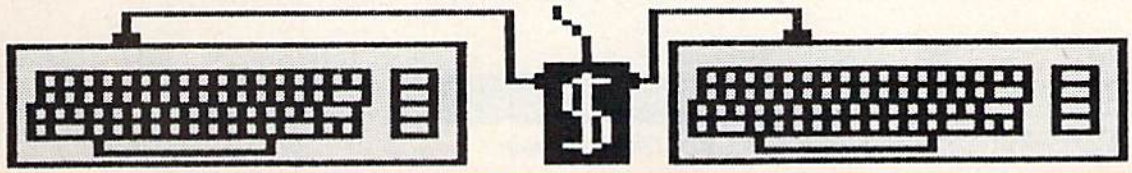

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MATH SQUARE-OFF

Here's a challenge for young and old who like puzzles that sharpen their math skills.

By MICHAEL BROUSSARD

Math Scramble is neither as easy as it looks when you read the directions, nor as difficult as it seems when you first try it.

Those of you with unexpanded VICs should omit lines 2500–2550 so the program will fit into the available RAM. (The lines are part of the code that prints the directions—once you read the article, the directions are not necessary.)

Preparation for Play

When the game begins, you are prompted to set the level of difficulty, from 1 to 4. Each level corresponds to an arithmetic function. Level 1 is addition; 2 is subtraction; 3 is multiplication; 4 is division.

If you choose 1, only addition will be used. If you choose 2, both addition and subtraction are required, and so on up to 4, at which point all four operations are employed. Remember that operations are chosen at random, so there is a chance that a game board will be generated that contains, for example, no multiplication, even though you specified level 4.

After you choose the level of difficulty, the computer asks you for the highest digit you want to use. Enter a number from 1 to 9; the problems will then include digits only up through the one you chose. For example, if you press 6, all numbers used will be less than or equal to 6. Thus, you can begin children with low digits and level 1, and then adjust the digits and level as they progress in ability.

The last question the computer asks before starting the game is whether or not you want to include negative numbers. If you answer yes, it's possible that one or more of the problems will involve negative numbers. If you answer no, all numbers will be positive. For example, you'll never get a problem like 1 – 4 + 8, because, even though the answer is positive (5), you'll run into a negative intermediate result as you solve the problem.

Also, the program will never generate a problem that involves fractions, even in intermediate results. (The game is hard enough without them!)

How To Play

Math Scramble is played on a grid. Each row and column is a math problem that you must solve within a limited amount of time. (A game lasts for 100 seconds or until you solve the puzzle.)

There are actually six problems on the grid—three across and three down. The answers appear in the appropriate places outside the grid. The six problems in this example are:

```
2 × 6 + 3 = 15
3 + 4 × 5 = 35
4 × 2 – 5 = 3
2 × 3 – 4 = 2
6 + 4 + 2 = 5
3 + 5 + 5 = 13
```

You must solve the problems step by step, from left to right or from the top downwards. The answer to problem 2 is 35 because you add 3 + 4 to get 7, and then you multiply by 5 to get 35. This procedure differs from the standard mathematical convention, where multiplication and division are performed from left to right before any addition or subtraction is done.

The grid consists of arithmetic operations and numbers (randomly chosen) that are not in their correct positions. To solve the grid, you must swap numbers from one position to another until you create a sequence that equals the given answer.

Each grid position is numbered according to the following diagram:

```
1 2 3
4 5 6
7 8 9
```

When the computer prompts you to enter the numbers you wish to swap, type in their respective grid positions. For example, to switch the number in the upper-left corner with the number in the lower-right corner, you would type in 1 and 9. If you prefer, you may use certain keys on the keyboard as a keypad. These correspond to the numeric grid positions as follows:

```
1 2 3  :  I O P
4 5 6  :  K L  :
7 8 9  :  ,  .  /
```

Instead of pressing, for example, the 3 and 7 keys, you could press the P and , keys. These keys are located in a cluster, and, with a little practice, you should be able to move numbers quickly, without taking your eyes off the screen.

A timer at the top of the screen steadily counts down from 100 and turns red when you have 20 seconds left. Once you solve the grid, your score is the number of seconds remaining on the timer. You lose if you don't solve the puzzle before you run out of time, and the small grid on the left side of the screen will show you the correct solution.

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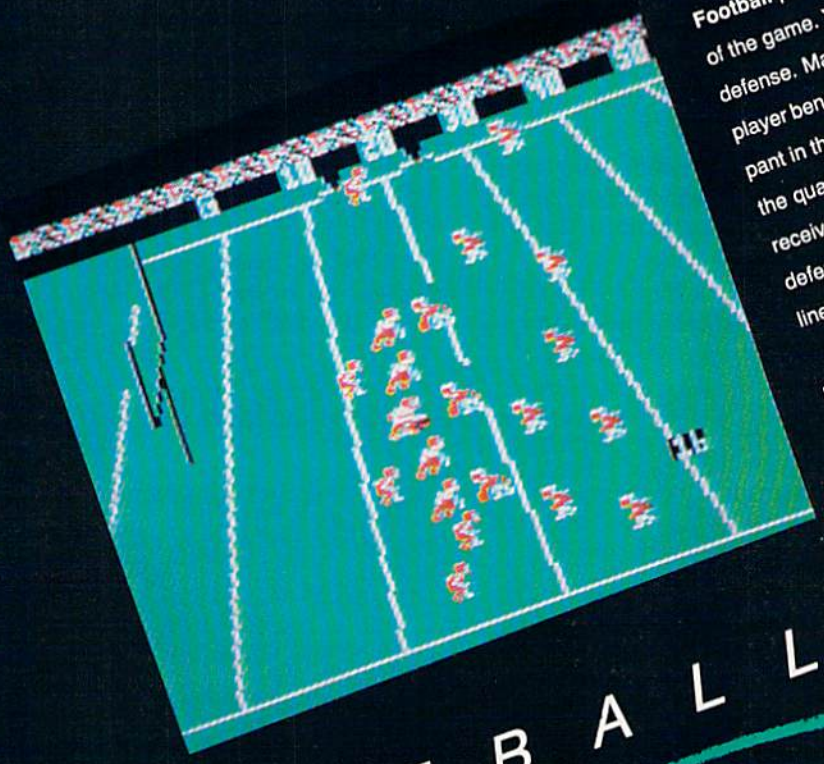

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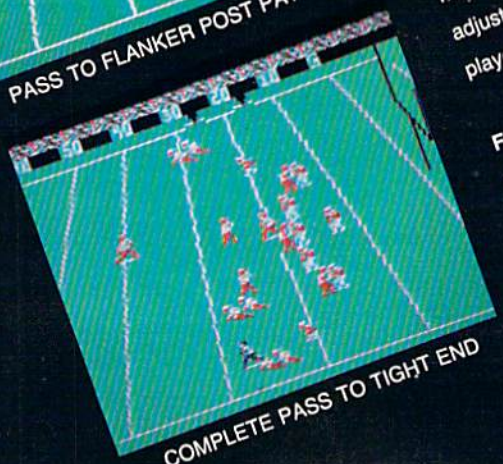

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You may find that 100 seconds is not enough time for your second- or third-grader to solve the puzzle. You can lengthen (or shorten) the game time by changing the value assigned to the variable CLOCK in line 1 of the program.

During play, the grid will be updated each time you specify positions to swap. When a column or row contains the correct values in the correct order, the equation's answer will appear in inverse video, signifying that part of the grid is correct.

Be careful! The computer is looking for only one correct answer to a whole grid. If you enter a row or column whose sequence yields the correct result, but whose answer doesn't appear in inverse video, then either the numbers in the problem are not the right ones (even if the result is correct) or the numbers are in the wrong order.

For example, you may see a row that looks like this:

```
2 + 3 + 6   11
```

Although the numbers add up to 11, the order in which they appear may be incorrect. Perhaps the row should read:

```
3 + 2 + 6   11
```

Or, it may mean that the answer for which the computer is looking actually consists of other numbers:

```
4 + 1 + 6   11
```

Once the game is over, you'll be asked if you want to play again, and the box in the screen's upper-left corner will be updated to show the highest score so far.

Math Scramble is challenging for players of all ages. Try it on your friends who think they hate math—they'll be pleasantly surprised by how much fun it can be! R

Address all author correspondence to Michael Broussard, 13136 Lazy Glen Court, Herndon, VA 22071.

Listing 1. *Math Scramble program.*

```
1 CLOCK=100:SYS65517:IFPEEK(781)=22THEN10
                                        :REM*17
2 POKE5328Ø,Ø:POKE53281,Ø:PRINTCHR$(142):PR
  INTCHR$(8):X=15:SW=4Ø:SS=1Ø24         :REM*34
9 GOTO 2Ø                               :REM*197
1Ø X=6:POKE36879,8:SW=22                :REM*148
12 SS=4*(PEEK(36866)AND128)+64*(PEEK(36869)
   AND112)                              :REM*244
2Ø GOSUB2ØØØ:DIMA(9),B(9),Z$(12),S(6):Y$="{
   SHFT +}{SHFT *}{SHFT V}{SHFT N}":REM*1Ø8
3Ø DEF FND(X)=INT(RND(1)*X)+1:PRINT"{CTRL 7
   }":DC$="{CTRL 7}"                    :REM*224
1ØØ SS=SS+SW*5+X+1:PL=6552Ø             :REM*166
1Ø5 X2$="{SHFT -} {SHFT -} {SHFT -} {SHFT -
   } {SHFT -} {SHFT -}"                 :REM*2Ø5
1Ø7 X1$="{SHFT -}{9 SPACEs}{SHFT -}"
                                        :REM*2Ø1
11Ø H$=MID$(STR$(Z),2):D$=MID$("{3 SHFT *s}
   ",1,LEN(H$)):PRINT"{SHFT CLR} HI":PRINT
   "{COMD A}"D$"{COMD S}"               :REM*144
112 PRINT"{SHFT -}"H$"{SHFT -}"         :REM*148
115 PRINT"{COMD Z}"D$"{COMD X}":PRINTTAB(X)
   "{SHFT U}{9 SHFT *s}{SHFT I}         :REM*253
12Ø FORI=1TO2:PRINTTAB(X);X1$           :REM*232
13Ø PRINTTAB(X)"{SHFT -} {SHFT U}{SHFT *}{S
   HFT I} {SHFT U}{SHFT *}{SHFT I} {SHFT -
   }":PRINTTAB(X);X2$                   :REM*218
16Ø PRINTTAB(X);"{SHFT -} {SHFT J}{SHFT *}{
   SHFT K} {SHFT J}{SHFT *}{SHFT K} {SHFT
   -}":NEXT:PRINTTAB(X);X1$             :REM*62
21Ø PRINTTAB(X)"{SHFT J}{9 SHFT *s}{SHFT K}
                                        :REM*72
215 WC$="{CTRL 7}":TM=CL:FORI=1TO9:A(I)=I:N
   EXT:GOSUB5ØØ                        :REM*231
22Ø GOSUB12ØØ:FORI=1TO9:B(I)=A(I):NEXT:N=1:
   FORI=ØTO4:J=SW*I*2+SS:K=8            :REM*4Ø
23Ø IFI/2=INT(I/2)THENJ=J+2:K=4         :REM*2Ø2
24Ø FORJ=JTOJ+KSTEP4:POKEJ,ASC(Z$(N))-128
                                        :REM*56
25Ø N=N+1:NEXTJ:NEXTI:GOSUB7ØØ          :REM*236
26Ø FORI=9TO1STEP-1:P=FND(I):B(Ø)=B(I):B(I)
   =B(P):B(P)=B(Ø):NEXT                 :REM*75
3ØØ N=1:FORI=ØTO2:FORJ=ØTO8STEP4         :REM*63
31Ø POKESS+I*SW*4+J,B(N)+48:N=N+1:NEXTJ:NEX
   TI                                   :REM*213
32Ø C=Ø:RESTORE:FORI=1TO6:READN1,N2,N3,N4,N
   5,N6,N7                              :REM*33
33Ø P1=B(N1):P2$=Z$(N2):P3=B(N3):GOSUB9ØØ
                                        :REM*69
34Ø P2$=Z$(N4):P3=B(N5):GOSUB9ØØ:POKE781,N6
   :POKE782,N7+X-(I>3)                  :REM*145
345 POKE783,Ø:SYS6552Ø                  :REM*32
35Ø IFA(N1)=B(N1)ANDA(N3)=B(N3)ANDA(N5)=B(N
   5)THENPRINT"{CTRL 9}";:C=C+1         :REM*83
355 PRINTS(I)"{CTRL Ø}";:NEXT:IFC=6THENPRIN
   T:PRINT"{2 CRSR DNs}"TAB(X-1)"{2 SPACEs
   }YOU WIN!!{2 SPACEs}":GOTO8Ø5        :REM*116
36Ø PRINT:PRINT"{2 CRSR DNs}"TAB(X-1)"SWAP{
   9 SPACEs}{9 CRSR LFs}";:GOSUB6ØØ:P1=D
                                        :REM*221
37Ø PRINT"WITH";:GOSUB6ØØ:P2=D:P3=B(P1):B(P
   1)=B(P2):B(P2)=P3:GOTO3ØØ            :REM*227
5ØØ REM P=SS-X-1+SW*3:FORI=1TO9:POKEP,A(I)+
   48:P=P+2:IFI/3=INT(I/3)THENP=P+*SW-6
                                        :REM*49
5Ø1 P=SS-X+SW*3+1:FORI=1TO9:POKEP,A(I)+48:P
   =P+1:IFI/3=INT(I/3)THENP=P+SW-3:REM*124
51Ø NEXT:RETURN                         :REM*195
6ØØ PRINT": {COMD @}";                  :REM*242
6Ø5 K=1                                 :REM*55
61Ø GETP$:IFP$<>""THEN66Ø               :REM*84
62Ø K=K+1:IFK<63THEN61Ø                 :REM*198
63Ø TM=TM-1:GOSUB7ØØ:IFTM=ØTHEN8ØØ      :REM*232
635 IFTM<=2ØTHENWC$="{CTRL 3}"          :REM*165
64Ø GOTO6Ø5                             :REM*4
66Ø D=1                                 :REM*82
662 IFD<19THENIFP$<>MID$("123456789IOPKL:,.
   /",D,1)THEND=D+1:GOTO662             :REM*15Ø
664 IFD=19THEN61Ø                       :REM*182
666 IFD>9THEND=D-9                      :REM*238
67Ø PRINT"{3 CRSR LFs}{3 SPACEs}{3 CRSR LFs
   }"D;:RETURN                          :REM*6
7ØØ POKE783,1:SYSPL:C1=PEEK(781):C2=PEEK(78
   2)                                   :REM*2Ø6
71Ø POKE783,Ø:POKE781,Ø:POKE782,X+5:SYSPL
                                        :REM*96
72Ø PRINT"{CTRL 9}"WC$;MID$(STR$(TM),2)"{CT
   RL Ø} ";DC$                          :REM*84
73Ø POKE781,C1:POKE782,C2:POKE783,Ø:SYSPL:R
   ETURN                                :REM*224
8ØØ PRINT:PRINT"{CRSR UP}"TAB(X-1)"{2 SPACE
   s}GAME OVER":GOSUB5ØØ                :REM*199
8Ø5 IFTM>ZTHENZ=TM                      :REM*232
81Ø PRINTTAB(X-4)"{CRSR DN}ANOTHER GAME (Y/
   N)?"                                 :REM*3
82Ø GETA$:IFA$=""THEN82Ø                :REM*29
83Ø IFA$="Y"THEN11Ø                     :REM*9
84Ø END                                 :REM*77
9ØØ IFP2$="{SHFT +}"THENP1=P1+P3:RETURN
                                        :REM*195
```

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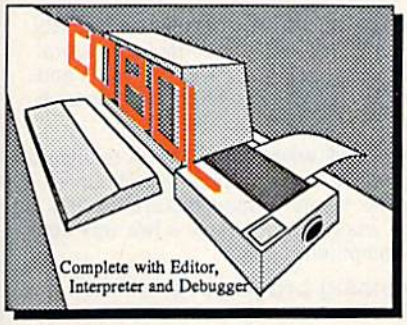

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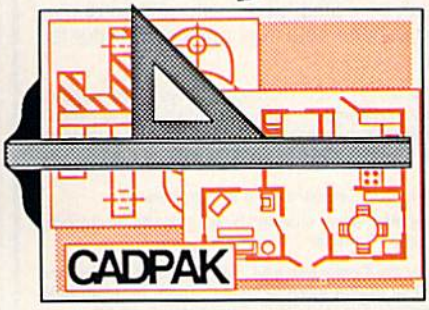

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Listing 1 continued.

```
91Ø IFP2$="{SHFT *}"THENP1=P1-P3:RETURN
                                    :REM*179
92Ø IFP2$="{SHFT V}"THENP1=P1*P3:RETURN
                                    :REM*211
93Ø IFP3=ØTHENP1=-999:RETURN        :REM*79
94Ø P1=P1/P3:RETURN                 :REM*229
1ØØØ DATA 1,1,2,2,3,5,11,4,6,5,7,6,9,11,7,1
     1,8,12,9,13,11                 :REM*73
1Ø1Ø DATA 1,3,4,8,7,16,-1,2,4,5,9,8,16,3,3,
     5,6,1Ø,9,16,7                  :REM*2Ø9
12ØØ K=1:FORI=ØTO2:P1=FND(H+1)-1:P3=-99:GOS
     UB15ØØ:A(I*3+1)=P1             :REM*152
121Ø Z$(K)=MID$(Y$,P2,1):A(I*3+2)=P3:P1=P4:
     P3=-99:GOSUB15ØØ               :REM*244
122Ø Z$(K+1)=MID$(Y$,P2,1):A(I*3+3)=P3:K=K+
     5:S(I+1)=P4:NEXT:K=3           :REM*96
123Ø FORI=1TO3:P1=A(I):P3=A(I+3):GOSUB15ØØ:
     Z$(K)=MID$(Y$,P2,1):P1=P4:P3=A(I+6)
                                    :REM*124
124Ø GOSUB15ØØ:Z$(K+5)=MID$(Y$,P2,1):K=K+1:
     S(I+3)=P4:NEXT                 :REM*144
15ØØ F=Ø:C=Ø:IFP3<>-99THENF=1:GOTO152Ø
                                    :REM*77
151Ø IFF=ØTHENP3=FND(H+1)-1         :REM*245
152Ø P2=FND(NO)                     :REM*95
1525 ONP2GOTO153Ø,154Ø,155Ø,156Ø     :REM*6Ø
153Ø P4=P1+P3:RETURN                :REM*2Ø5
154Ø P4=P1-P3:IFP4<ØANDNF=ØTHEN158Ø :REM*66
1545 RETURN                         :REM*73
155Ø P4=P1*P3:RETURN                :REM*226
156Ø IFP3=ØTHEN158Ø                 :REM*54
157Ø P4=P1/P3:IFP4=INT(P4)THENRETURN
                                    :REM*158
158Ø C=C+1:IFC<3THEN151Ø            :REM*25Ø
159Ø P2=FND(2)*2-1:GOTO1525         :REM*3Ø
2ØØØ PRINT"{SHFT CLR}":FORI=1TO42:READN:NEX
     T:L=Ø                          :REM*85
2Ø1Ø PRINTTAB(X-1)"{CTRL 3}{CTRL 9}MATH SCR
     AMBLE{CTRL 7}{2 CRSR DNs}"     :REM*165
2Ø2Ø READX$:IFX$="*"THEN2Ø5Ø         :REM*23
2Ø25 IFX$="/"THENPRINT:L=Ø:GOTO2Ø2Ø:REM*2Ø2
2Ø3Ø IFL+LEN(X$)>=SWTHENPRINT:L=Ø    :REM*163
2Ø4Ø L=L+LEN(X$)+1:PRINTX$"{SHFT SPACE}";:G
     OTO2Ø2Ø                        :REM*53
2Ø5Ø PRINT:PRINTTAB(X-6)"{CRSR DN}{CTRL 9}P
     RESS ANY KEY TO START"         :REM*21Ø
2Ø6Ø GETP$:IFP$=""THEN2Ø6Ø          :REM*236
2Ø7Ø PRINT"{SHFT CLR}{2 CRSR DNs}"TAB(X-3)"
     ENTER LEVEL (1-4)"             :REM*1Ø8
2Ø8Ø PRINT"{CRSR DN}"TAB(X-6)"1) {SHFT +}{2
      SPACEs}2) {SHFT *}{2 SPACEs}3) {SHFT
     V}{2 SPACEs}4) {SHFT N}"       :REM*86
2Ø9Ø GETP$:IFP$<"1"ORP$>"4"THEN2Ø9Ø  :REM*58
21ØØ NO=VAL(P$):PRINT"{CRSR DN}"TAB(X-5)"HI
     GHEST DIGIT TO USE?"           :REM*88
211Ø GETP$:IFP$<"Ø"ORP$>"9"THEN211Ø:REM*15Ø
212Ø H=VAL(P$):PRINT"{CRSR DN}"TAB(X-6)"NEG
     ATIVE NUMBERS (Y/N)?"          :REM*98
213Ø GETP$:IFP$<>"Y"ANDP$<>"N"THEN213Ø
                                    :REM*48
214Ø NF=Ø:IFP$="Y"THENNF=1          :REM*38
215Ø RETURN                         :REM*168
3ØØØ DATA SOLVE,THE,PROBLEMS,ON,THE,GRID,BY
     ,MOVING,NUMBERS,AROUND.        :REM*167
3Ø1Ø DATA SWAP,NUMBERS,BY,GIVING,THEIR,GRID
     ,"POSITIONS:",/,/              :REM*2Ø1
3Ø2Ø DATA"{4 SPACEs}123","{5 SPACEs}IOP",/
                                    :REM*157
3Ø3Ø DATA"{4 SPACEs}456"," OR{2 SPACEs}KL:"
     ,/                             :REM*163
3Ø4Ø DATA"{4 SPACEs}789","{5 SPACEs},./",/,
     /                              :REM*2Ø9
3Ø5Ø DATATIME,RUNS,OUT,IN,1ØØ,SECONDS.,GOOD
     ,LUCK!                         :REM*243
5ØØØ DATA *                         :REM*251
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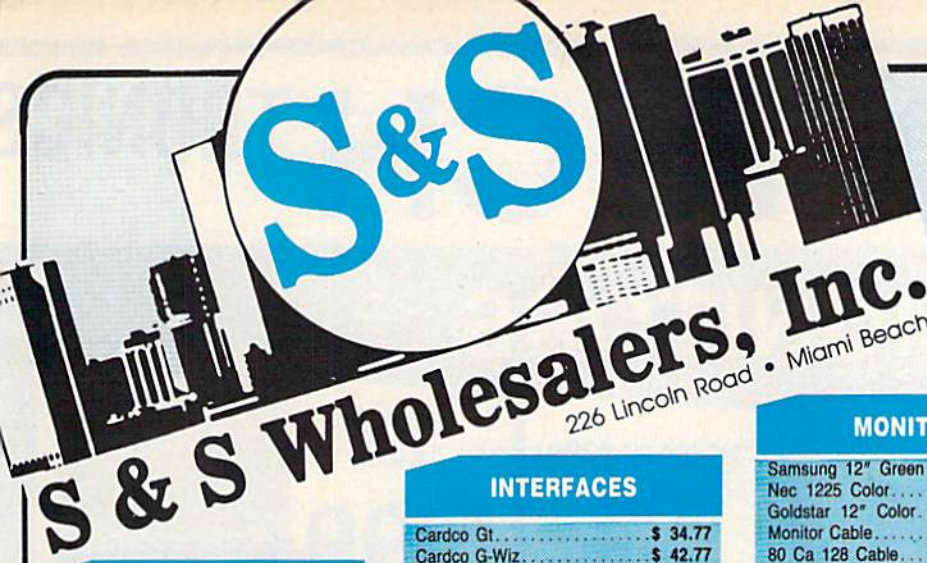

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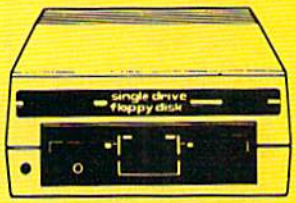

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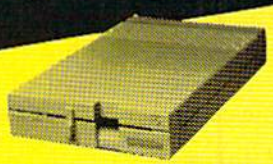

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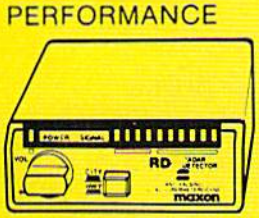

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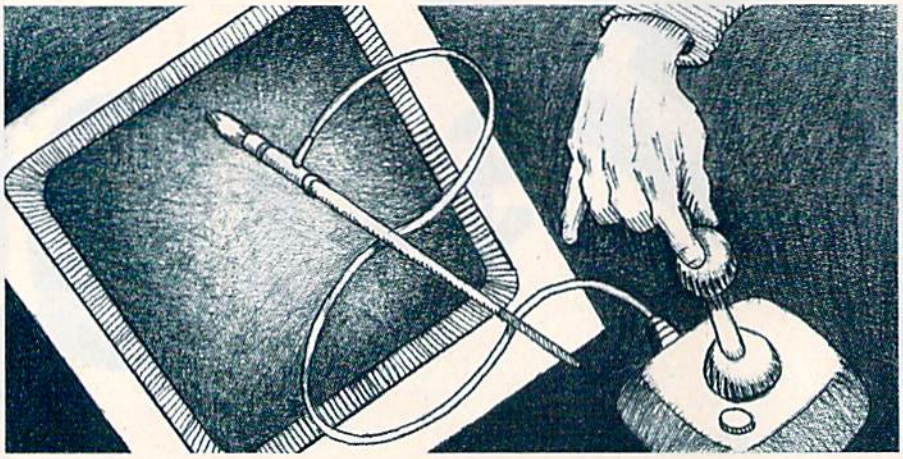
MICRO ARTIST

Here's a quick glimpse into the world of Commodore high-resolution graphics for the C-128, C-16 and Plus/4. Using your monitor as a canvas and your joystick as a paintbrush, let your artistic imagination run wild!

By DOUGLAS G. GANNON



One of the advantages of the C-128, C-16 and Plus/4 is that you can easily perform high-resolution graphics on them. The following programs let you draw high-res graphics on any of these machines, using your joystick.

C-128 Mode

Plug your joystick into port 1 and load and run the Drawstick program for the C-128 (Listing 1). You'll be prompted for five colors; select numbers 1 through 16.

Use the W key to set the pixel width of your line (one to eight pixels). Number keys 1–3 switch you between colors 1–3; 0 is for erase. You can modify the program for a wider number of pixels in line 120, and you can change the starting position of the dot in line 90 by changing the X and Y values.

It's interesting to note how colors are set in line 70; the use of the Joy function in line 100, with its related routine (lines 170–250); and the Draw statement in line 280, which is the heart of the program.

If you decide to change the colors after you've already started, just press the run/stop and restore keys, remove the ,1 at the end of the Graphic statement in line 80 and run the program again. This will cause the colors to bleed where the new color touches the old.

C-16 and Plus/4, Too

With Drawstick for the C-16 and Plus/4 (Listing 2), you can draw lines of varying widths (one to eight pixels) and select from all 121 colors for your background or lines.

To change one of the C-16's or Plus/4's 16 primary colors, press C. To change luminance (there are eight levels), press L. To vary the line width, press W. The line is set at a maximum of eight pixels, but you can easily modify this number in line 160.

At the beginning of the program, you'll be prompted to set the background color and luminance. If the screen is blank after the program continues, then your background is probably the same color as your lines. Just press C, and a dot should appear at the center of the screen. If you don't want the line to start in the middle of the screen, you may move it by changing the X and Y values in line 90.

To change the line from solid to textured and create a transparent appearance, move the joystick at a 45-degree angle from the center. You can erase an area by changing your line color to the background color and going back over the area. To exit the program, press the run/stop key, then the f1 key. In line 10, the f1 key has been programmed to return to the Text mode.

Other points of interest in this program are the flash-on and flash-off symbols used in the title (line 20) and the very easy-to-use Joy function in line 100, with its related routine in lines 200–280.

With the Drawstick programs, you will be able to enjoy immediate results as you explore the graphics capabilities of your Commodore. ®

Address all author correspondence to Douglas G. Gannon, PO Box 190043, Anchorage, AK 99519.

Listing 1.

Drawstick program for the C-128.

```
10 PRINT"{SHFT CLR}{2 CRSR DNs}"
   ;TAB(12);"DRAWSTICK128{4 CRSR
    DNs}"                  :REM*236
20 INPUT"BACKGROUND COLOR (1-16)
   ";A                     :REM*186
30 INPUT"COLOR 1 (1-16)";B
                           :REM*18
```

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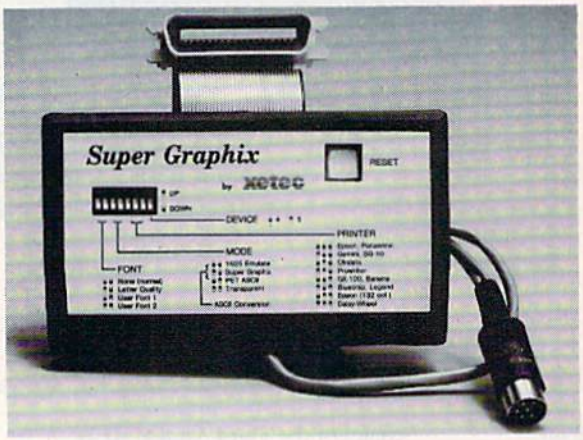

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Listing 1 continued.

```
40 INPUT"COLOR 2 (1-16)";C
                          :REM*48
50 INPUT"COLOR 3 (1-16)";D
                          :REM*78
60 INPUT"BORDER COLOR (1-16)";E
                         :REM*194
70 COLOR0,A:COLOR1,B:COLOR2,C:CO
   LOR3,D:COLOR4,E        :REM*58
80 GRAPHIC3,1             :REM*78
90 X=80:Y=100:W=0:C=1     :REM*210
100 N=JOY(1):GETA$        :REM*188
110 IFA$="W"THENW=W+1     :REM*240
120 IFW>7THENW=0          :REM*10
130 IFA$="0"THENC=0       :REM*12
140 IFA$="1"THENC=1       :REM*166
150 IFA$="2"THENC=2       :REM*66
160 IFA$="3"THENC=3       :REM*220
170 IFN=1THENY=Y-1:X=X    :REM*86
180 IFN=2THENX=X+1:Y=Y-1:REM*168
190 IFN=3THENX=X+1:Y=Y    :REM*196
200 IFN=4THENX=X+1:Y=Y+1:REM*250
210 IFN=5THENY=Y+1:X=X    :REM*250
220 IFN=6THENY=Y+1:X=X-1  :REM*50
230 IFN=7THENX=X-1:Y=Y    :REM*112
240 IFN=8THENX=X-1:Y=Y-1:REM*170
250 IFN=0THENX=X:Y=Y      :REM*78
260 IFX=<0THENX=0         :REM*245
270 IFY=<0THENY=0          :REM*9
280 DRAWC,X,YTOX+W,Y+W:GOTO100
                          :REM*229
```

Listing 2.

Drawstick program for the C-16 and Plus/4.

```
10 KEY1,"GRAPHIC0"+CHR$(13)+"LIS
   T"+CHR$(13)
14 REM
15 REM *** TITLE PAGE & INPUT BA
   CKGROUND COLOR ***
20 PRINT"{SHFT CLR}{4 CRSR DNs}"
   ;TAB(14);"DRAWSTICK+4{5 CRS
   R DNs}"
30 FORD=1TO1000:NEXTD
50 INPUT"BACKGROUND COLOR (1-16)
   ";B
60 INPUT"BACKGROUND LUMINANCE (0
   -7)";H
64 REM
65 REM *** SET COLORS, GRAPHIC M
   ODE & SET VARIABLES ***
70 COLOR0,B,H:COLOR4,B,H
80 GRAPHIC1,1
90 X=160:Y=100:W=0:C=1:L=7
94 REM
95 REM *** READ JOYSTICK & GET K
   EY ***
100 N=JOY(1)
120 GETA$
124 REM
125 REM *** SET COLOR, PIXELS &
    LUMINANCE ***
130 IFA$="C"THENC=C+1
140 IFC>16THENC=1
150 IFA$="W"THENW=W+1
160 IFW>7THENW=0
170 IFA$="L"THENL=L+1
180 IFL>7THENL=0
190 COLOR1,C,L
194 REM
195 REM *** CHANGE X & Y WITH JO
    YSTICK ***
200 IFN=1THENY=Y-1:X=X
210 IFN=2THENX=X+1:Y=Y-1
220 IFN=3THENX=X+1:Y=Y
230 IFN=4THENX=X+1:Y=Y+1
240 IFN=5THENY=Y+1:X=X
250 IFN=6THENY=Y+1:X=X-1
260 IFN=7THENX=X-1:Y=Y
270 IFN=8THENX=X-1:Y=Y-1
280 IFN=0THENX=X:Y=Y
290 DRAW1,X,YTOX+W,Y+W
300 GOTO100
```

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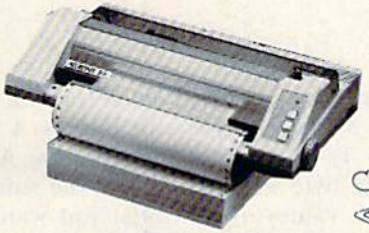

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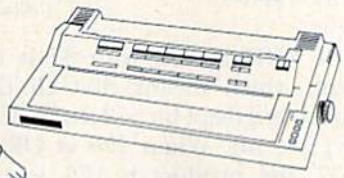

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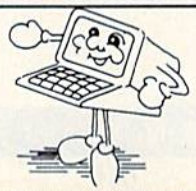

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COMM AND-OR 64

Play with this program for a while and you'll understand AND and OR.

By SCOTT M. HUSE and WILLIAM D. TAYLOR

Comm AND-OR 64 is a program that produces quick reference tables designed to help programmers understand the logical (Boolean) operators AND and OR in the Basic language. While Comm AND-OR is a C-64 program, the concepts it illustrates apply to programming in any version of Basic.

Programmers usually use AND and OR to compare corresponding bits in two bytes (the operands) to see if the bits are on (1) or off (0). The logical AND generates a result of 1 only if *both* corresponding bits are 1; if only one or neither of the bits is 1, the result is 0. The logical OR generates a 1 if *either or both* operand bits are 1, and a 0 if neither is. The truth table in Table 1 presents all the combinations of the bit values 1 and 0 and their AND and OR results.

Table 2 details AND and OR operations on two sample decimal numbers, 170 and 37. The result, or "product," of ANDing 170 with 37 is 32 decimal, which means that all the product bits except bit 5 (2 to the fifth power) are off. When 170 is ORed with 37, the product is 175, which means that all product bits except 2 and 4 are on.

Programmers commonly use AND and OR to test if certain bits are on or off. If you AND a byte with the value of a bit number, the result is that bit value if the bit was on, and 0 if the bit was off. For example, referring again to Table 2, if you want to know whether bit 4 is on in the byte containing the decimal value 170, AND the byte with 16 (the decimal value of bit 4). Since bit 4 was off in this case, your product is 0. If you'd tested for bit 3 (by ANDing with 8), the result would have been 8, since bit 3 was on.

To turn on a bit (or bits) in a byte, OR the byte with the sum of the decimal values of the bit(s) you want to turn on. For example, to turn on bits 0–3, OR the byte with 15 (8 + 4 + 2 + 1). To turn off a bit (or bits), AND the byte with 255 minus the sum of the values of the bit(s) you want to turn off.

To better understand how this works, type in and run Comm AND-OR 64; then input any number from 0 to 255. The computer will translate your number into binary notation, then AND your number with a randomly generated number and display the result. Next it will take that result and OR it with another randomly generated number, displaying the second result. Keep typing in numbers, and soon you'll be confident enough with these logical operators to write them into your own programs. ®

Address all author correspondence to Scott M. Huse and William D. Taylor, Pinecrest B.T.C., Route 29A, Salisbury Center, NY 13454.

Table 1. *AND-OR truth table.*

AND	OR
1 AND 1 = 1	1 OR 1 = 1
1 AND 0 = 0	1 OR 0 = 1
0 AND 1 = 0	0 OR 1 = 1
0 AND 0 = 0	0 OR 0 = 0

Table 2. *ANDing and ORing decimal number 170 with 37.*

Bit number	7	6	5	4	3	2	1	0
Bit value	128	64	32	16	8	4	2	1
Binary notation for 170	1	0	1	0	1	0	1	0
Binary notation for 37	0	0	1	0	0	1	0	1
AND result	0	0	1	0	0	0	0	0
OR result	1	0	1	0	1	1	1	1

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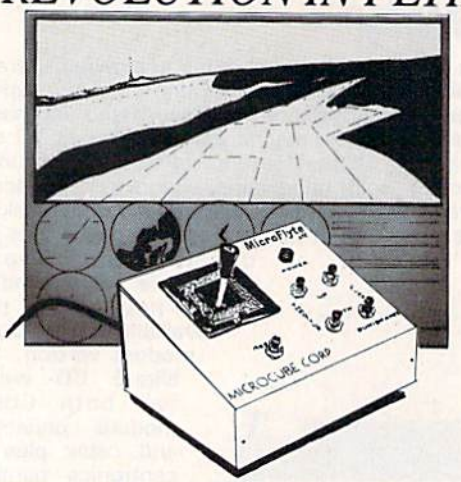

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Listing 1. *Comm AND-OR 64 program.*

```
10 REM COM AND-OR 64                          :REM*52
12 REM DR. SCOTT M. HUSE AND/OR WILLIAM D.
    TAYLOR                                    :REM*60
16 POKE53280,15:POKE53281,15:PRINT"{SHFT C
   LR}{CTRL 1)"                               :REM*168
17 POKE2040,13:FORL=832TO894:READD:POKEL,D
   :NEXT:V=53248:POKEV+21,1:POKEV+39,0
                                              :REM*196
18 POKEV+29,1:POKEV,25:POKEV+1,55 :REM*112
19 PRINTTAB(17)"COM AND-OR 64":PRINTTAB(17
   )"{3 COMD Ts} {3 COMD Ts} {2 COMD Ts} {
   2 COMD Ts}"                                :REM*178
20 INPUT"{HOME}{7 CRSR DNs}DECIMAL NUMBER
   (0-255)";D:PRINT"{HOME}{2 CRSR DNs}"
                                              :REM*110
21 IFD<0ORD>255ORD<>INT(D)THENRUN :REM*204
22 L$="{7 SPACEs}{SHFT B}{3 SPACEs}{SHFT B
   }{3 SPACEs}{SHFT B}{3 SPACEs}{SHFT B}{3
    SPACEs}{SHFT B}{3 SPACEs}{SHFT B}{3 SP
   ACEs}{SHFT B}{3 SPACEs}{SHFT B}{3 SPACE
   s}{SHFT B}"                                :REM*228
23 L2$="{7 SHFT Cs}{SHFT +}{3 SHFT Cs}{SHF
   T +}{3 SHFT Cs}{SHFT +}{3 SHFT Cs}{SHFT
    +}{3 SHFT Cs}{SHFT +}{3 SHFT Cs}{SHFT
   +}{3 SHFT Cs}{SHFT +}{3 SHFT Cs}{SHFT +
   }{3 SHFT Cs}{COMD W}"                      :REM*112
24 PRINTSPC(7)"{COMD A}{3 SHFT Cs}{COMD R}
   {3 SHFT Cs}{COMD R}{3 SHFT Cs}{COMD R}{
   3 SHFT Cs}{COMD R}{3 SHFT Cs}{COMD R}{3
    SHFT Cs}{COMD R}{3 SHFT Cs}{COMD R}{3
   SHFT Cs}{COMD S}";                         :REM*92
25 PRINT"BIT #{2 SPACEs}{SHFT B} 7 {SHFT B
   } 6 {SHFT B} 5 {SHFT B} 4 {SHFT B} 3 {S
   HFT B} 2 {SHFT B} 1 {SHFT B} 0 {SHFT B}
   ";                                         :REM*162
26 PRINTL$"BIT VAL{SHFT B}128{SHFT B} 64{S
   HFT B} 32{SHFT B} 16{SHFT B} 8 {SHFT B}
    4 {SHFT B} 2 {SHFT B} 1 {SHFT B}";:PRI
   NTL2$;                                     :REM*33
27 PRINTL$"{3 SPACEs}";:N=D:GOSUB360
                                              :REM*79
28 PRINTL$"AND";:N=255*RND(1):GOSUB360:PRI
   NTL$;L2$;                                  :REM*235
29 PRINTL$" = ";:N=NANDD:GOSUB360 :REM*209
30 PRINTL$"OR ";:D=N:N=255*RND(1):GOSUB360
   :PRINTL$;L2$;                              :REM*67
31 PRINTL$" = ";:N=DORN:GOSUB360  :REM*237
32 PRINTSPC(7)"{COMD Z}{3 SHFT Cs}{COMD E}
   {3 SHFT Cs}{COMD E}{3 SHFT Cs}{COMD E}{
   3 SHFT Cs}{COMD E}{3 SHFT Cs}{COMD E}{3
    SHFT Cs}{COMD E}{3 SHFT Cs}{COMD E}{3
   SHFT Cs}{COMD X}";                         :REM*11
33 PRINTSPC(13)"PRESS <SPACE BAR>..."
                                              :REM*9
34 GETK$:IFK$<>" "THEN340                     :REM*9
35 RUN                                        :REM*137
36 N=INT(N):PRINTSPC(4-LEN(STR$(N)))N"{CRS
   R LF}{SHFT B}";                            :REM*97
37 FORL=7TO0STEP-1:PRINT-((NAND2{UP ARROW}
   L)=2{UP ARROW}L)"{SHFT B}";:NEXT:RETURN
                                              :REM*25
38 PRINT-((NAND2{UP ARROW}L)=2{UP ARROW}L)
   "{SHFT B}";:NEXT                           :REM*173
39 RETURN                                     :REM*193
40 DATA 127,255,224,127,255,240,120,000
                                              :REM*55
41 DATA 048,247,240,016,244,144,016,240
                                              :REM*159
42 DATA 128,016,240,187,144,240,145,016
                                              :REM*165
43 DATA 241,223,016,112,017,016,112,059
                                              :REM*11
44 DATA 144,120,000,048,127,255,240,056
                                              :REM*177
45 DATA 030,112,031,255,240,000,000,000
                                              :REM*73
46 DATA 127,255,248,114,170,164,057,085
                                              :REM*41
47 DATA 082,012,047,225,007,255,255,150
                                              :REM*97
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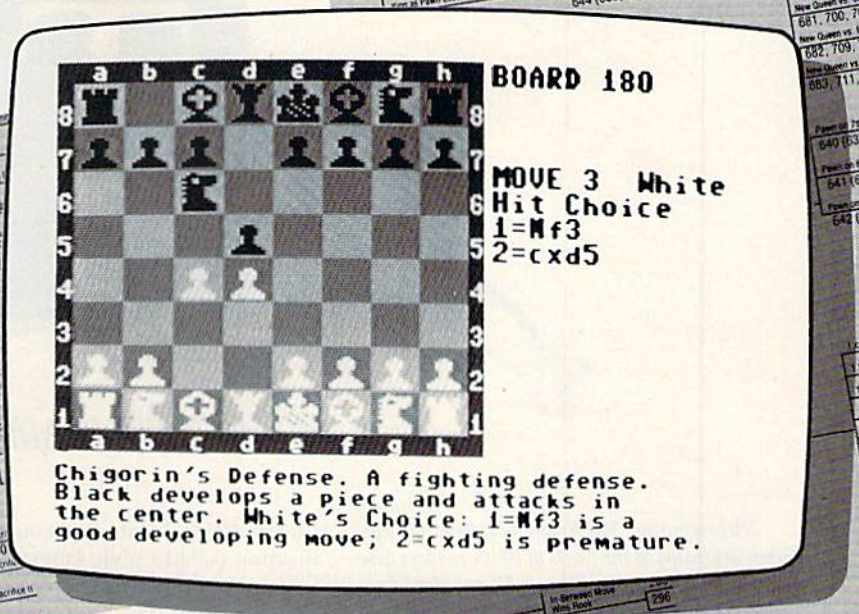
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2=cxd5
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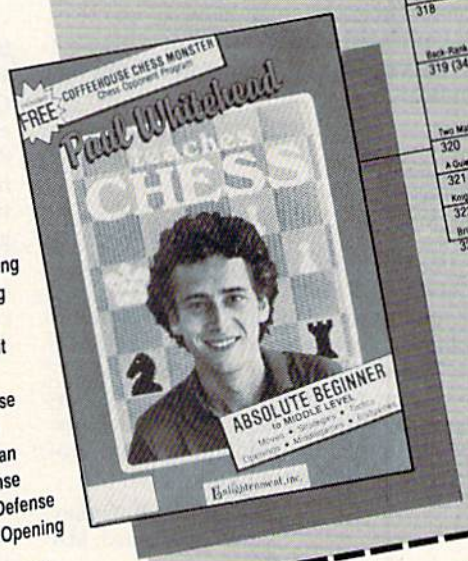

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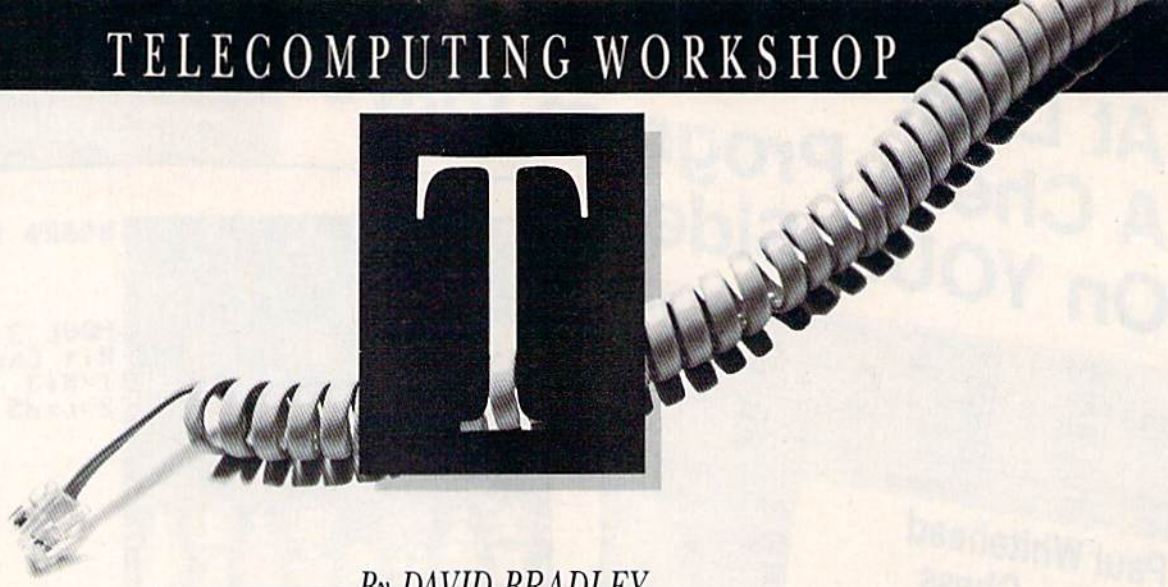


By DAVID BRADLEY

Telecomputing Workshop is a monthly column dedicated to the needs of RUN *readers who are using, or intend to use, a Commodore computer for telecommunications. We invite you to submit your questions or comments to:*

David Bradley
Telecomputing Workshop
c/o RUN *magazine*
Elm St.
Peterborough, NH 03458

I use Vax and Cyber computers at work and would like to access them from my C-64 at home. Do you know of any telecommunications software that will make a C-64 emulate a VT100 terminal so I can do this?

Mike Loudiana
Kent, WA

I own a C-128 and want to purchase a modem and terminal program so I can communicate with an IBM 3081 mainframe at work. The company I work for has a complex telecommunications network that requires an auto-dial/auto-answer modem and a terminal program capable of VT100 emulation. What modem and program can I use?

Thomas R. Gidley
Bradford, MA

VT100 terminal emulators for both the C-64 and the C-128 are available.

Rich-Hill Telecommunications International (200 West Beaver Creek Road, Unit 15, Richmond Hill, Ontario, Canada L4B 1B4; 416-731-1621) sells one for the C-64. It's called IntelTerm and costs $39.95. A new version that auto-dials with various modems and auto-answers will be out soon.

I've also heard about a VT52 emulator for the 64 that's in the public domain. You can probably locate it through an organization called Public Domain Solutions that specializes in tracking down public domain programs. Their address is PO Box 832, Tallevast, FL 34270.

A VT100 emulator for the C-128 in 128 mode is included on a disk of terminal programs that comes with the Commodore 1670 300-/1200-baud modem. The 1670 is an auto-dial/auto-answer modem, so with it you'll have everything you need to communicate with an IBM 3081.

I have a Total Telecommunications 300-baud modem that I use with my C-64. When I'm connected to a local BBS or QuantumLink for a relatively short time, everything works fine, but when I'm downloading a large program or I'm connected to QuantumLink's People Connection for a good while, I start getting garbage on the screen and can't enter anything from the keyboard. This usually occurs after about an hour and a half of continuous use. Any suggestions?

Robert W. Sink
Centerville, OH

The fact that your computer works fine until it gets good and warm suggests a failing power supply—a problem most C-64 owners run into at one time or another. This may happen when you're online because using your modem adds slightly to the power demand.

Try borrowing a power supply and see if you still have the problem. If you can't borrow one, then buy one; it won't be a major investment and will probably solve your problem.

If all else fails, it might help to make sure the power supply you have gets plenty of ventilation. Mine, which I got four years ago, still works, and it's had a fan blowing over it for almost all its life. A small, quiet fan will do the trick.

I have a Commodore 1064 modem. I don't know of any bulletin boards near where I live, and the closest node of CompuServe is too expensive to call. Do you have a list of bulletin boards for my area?

Don Lewandowski
West Newton, PA

I recently received a modem as a gift. I'm interested in calling some BBSs, but haven't been able to find any. I've tried to contact a user group, but there doesn't seem to be one in my area. Could you print a list of numbers, or tell me where I can find a list?

Brian Catalano
Whittier, CA

It's often possible to find numbers for BBS systems by inquiring at a computer store, asking friends or checking with a user group. If that doesn't work, however, try *RUN*'s bulletin board, The Running Board, at 603-924-9704. It has a section that lists BBS numbers.

If you have a BBS system and would like it listed on The Running Board, write to us here at *RUN* and give us the particulars. Include the machine your system runs on; the machines, up- and download protocols and baud rates it supports; the telephone number; the sysop's name; the operating hours; and any other pertinent information.

I've been using my C-128 and a modem to access local bulletin boards and the Australian VidioTex system, VIATEL. I'd also like to communicate with the mainframe DEC VAX 11/780 computer at my university, but my computer would need to emulate a DEC VT100 terminal. I've been unable to find any VT100-emulation

programs for the C-128 except the Mitey Mo package from Computer Devices International, which will emulate a VT100 terminal using a C-64 and an XL-80 cartridge. Since the 128 already has 80 columns and I already own a modem, the Mitey Mo package doesn't seem like a very elegant solution to my problem. Can you suggest any program packages that would work?

Chris Brittain
Red Hill, Australia

One of the terminal programs/emulators included with the Commodore 1670 modem is exactly what you're looking for. It's called VT100-128, and with it, the C-128 emulates a DEC VT100 terminal in 80-column mode. If Commodore is selling the 1670 in Australia, you should be able to get a copy of VT100 from anyone who has the modem.

I've seen a program called Runterm Plus mentioned several times in Telecomputing Workshop, but I missed the issues of *RUN* in which the listing was published. Where can I get the program?

Tim Kollas
Hood River, OR

The C-64 terminal program you refer to appeared in the December 1985 and January 1986 issues of *RUN*. You can get back issues of the magazine by sending $3.50 plus $1 shipping and handling for each copy to *RUN*, Back Issue Orders, Elm St., Peterborough, NH 03458.

If you'd rather not type the listing in, send for the Productivity Pak II disk from *RUN* instead. It costs only $21.95 and contains Runterm Plus, along with a couple of new, never-before-published auto-dial programs that go with it, plus lots of other high-quality programs. You can order the disk through the Productivity Pak II ad in this issue of the magazine. Look under RUN in the List of Advertisers on the last page to locate the ad.

I've just bought a Taihaho model TH-002 modem. When I call some BBSs, it works perfectly—even BBSs that run on Apples. However, with some C-64 bulletin boards, I get garbage on the screen. The sysops say it's either my parity or my stop-bit settings, but I've altered these in every possible combination, and I still get garbage. What should I do?

Aaron Mumphrey
Pearl River, LA

It sounds as though the trouble might be a severe case of line noise occurring between you and certain BBSs. The only way I can think of to verify this is to take your modem to visit another Commodore user in your area and try it from there.

If you don't know anyone else with a Commodore, take your entire system to a friend's house. If the results are the same, it's very possible that there's something wrong with your system, but I'd still try it one more time at a third location.

If you do get through to the BBSs from another telephone, then the trouble probably does lie in your phone line. Contact the phone company; they may be able to help.

I've heard that the C-64 can't operate at 2400 baud. Is this true, and if it is, why can't it? Can the C-128 work at 2400 baud?

John Coldebella
Scottsdale, AZ

The answer to whether a C-64 can operate at 2400 baud is a definite almost maybe sometimes. It seems to depend on who you ask.

Rick Sterling says his terminal program, Sixth Sense, will make "most" C-64s work at 2400, but it's not guaranteed because apparently not all 64s have the same system ROMs or VIC II chips. He says that to use a C-64 at 2400 baud, you must adjust the baud rate factor (brf) to 113 ± 2. If that doesn't work, you've got the wrong kind of chips.

Steve Punter, of Punternet, tells me he's had a 64 going at 2400 with about 98 percent accuracy, but he couldn't save anything to disk with his 1541 drive at the same time. He said even a Buscard II hooked to an IEEE drive couldn't handle both jobs, and if that couldn't, there's no way a 1541 could.

David Williams suggests that the reason the 64 is slow when it comes to telecommunications is that it doesn't have an ACIA chip to handle telecommunications processing for the CPU. Instead, it simulates an RS-232 bus by means of firmware that depends on the nonmaskable interrupt. Every time a bit is received from the modem, an interrupt occurs, during which code is executed that handles the bit in the context of all the others that have recently been received. Thus, some CPU time is required to handle each bit. If the bits arrive too fast, the processor can't finish dealing with one before the next one arrives.

As to whether a C-128 will operate at 2400 baud, Rick Sterling says the C-128 (128 mode) version of Sixth Sense will handle it with no trouble at all. This is because the VIC II chip can be disabled in 128 mode, whereupon the machine runs at 2 MHz.

The best telecommunications machine Commodore has on the market is the Plus/4. It has an ACIA chip and can transmit and receive at up to 19.2 kilobaud.■

Q-LINK HAPPENINGS

GEOS Spoken Here

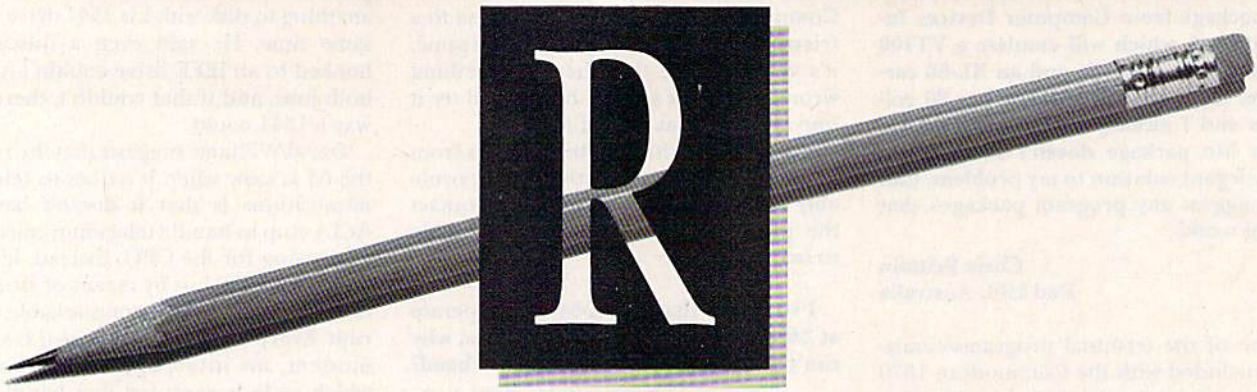
Do you have a question about GEOS, the new icon- and menu-based operating system for the C-64? Now you can get answers through the QuantumLink GEOS forum. This special-interest group lets you communicate with the developers of GEOS (Berkeley Softworks) and leave your questions for a company spokesperson to answer. Conferences to discuss GEOS applications and news on the latest GEOS developments and software are also featured on this SIG.

Picture This!

Ever wonder what the person you're chatting with on-line looks like? Q-Link members can now visualize their on-line acquaintances through the Photo Gallery section. Special photographic equipment converts subscriber photographs into computer programs, which produce digitized photos. Each program is then placed on-line in the Photo Gallery for other users to download and display.

Shopping Spree

The Mall, Q-Link's shopping section, has been expanded to include additional discounted products and a live auction. Members can save up to 50% by browsing through and bidding on such products as 1200-baud modems, software and electronic gadgets. Members can participate in this "live" auction by simply placing a bid on the item they wish to purchase.



By MARGARET MORABITO

Students in nine elementary schools in a Michigan district are learning from one mobile computer lab.

I'm now reassured that *RUN* readers are really paying attention to this column every month. In September's Resource Center, I offered to provide a disk of public domain educational programs, and it brought a huge response. I'm wearing out our MSD dual drive making copies, but it's worth it.

By the time you'd read my September offer, I had compiled a double-sided disk full of educational programs. Many of you sent a single-sided disk, which meant I could only give you half the programs. Therefore, I'm renewing my offer. If you'd like to receive a second disk of educational programs that have been donated by Resource Center readers, send me a disk at the address at the end of this article and I'll make you a copy. You might send a double-notched disk, in case I have even more programs by that time.

I'm also renewing my request for educational program donations. If you've written a program that you think other parents, teachers and students would benefit from, and you don't have an unquenchable thirst for profit, please send your program to The Resource Center. It will be shared with all our readers.

Now, on to the topic for this month: How are schools dealing with the responsibility of implementing computer literacy requirements?

The Problem

Three basic concerns are expressed in the letters I receive: not enough money, not enough computers and not enough computer teachers. The number of school districts that require teaching computer literacy to all students is growing, but in many districts, the funding for computer hardware, software and teaching staff is limited, so the job of implementing computer literacy courses is proceeding slowly.

The Grand Haven, Michigan, public schools faced a budget challenge last year when the school district decided to install a computer literacy program for all students. The specific objectives for the elementary school students were to acquire the ability to select and use software; to generate skills in basic keyboarding, problem-solving and decision-making, and in Basic and Logo programming; and to develop a knowledge of computer terminology, the uses of computers for individual and career choices, and the ethics of computer use. With these objectives established, the district had to figure out how to best equip its nine elementary schools, enrolling 180 to 400 students each, with computers and computer teachers, and not go broke in the process.

Spreading the Money Around

Grand Haven decided to develop a new teaching position: elementary computer teacher/consultant. This person would travel throughout the district to provide computer instruction in all nine elementary schools. The job requirements were a minimum of nine hours of coursework or equivalent experience in computer education, plus teaching or administrative experience.

The job included coordinating all computer activities for grades K–6; providing hands-on experience in a lab setting for grades 3–6; responsibility for the purchase, set-up and maintenance of equipment; scheduling lab classes; and other functions related to the computer project. Russell Stanton, a teacher for 16 years, got the job and is now head of a traveling computer lab composed of 15 C-64 computers, each with a 1541 disk drive and 1702 monitor, and a variety of printers.

The choice to buy Commodore equipment was based primarily on cost effectiveness. Stanton is continually asked, "Why not Apples?" His answer is simple: "With Commodore we are able to provide 15 set-ups, and all the goodies; with Apple I would have only six!" The district also wanted computers that would be portable, popular and easily maintained or replaced. In Stanton's words, "Commodore is the best choice; sound educational software is available, the hardware is entirely sufficient, the price is right, and the C-64 is the computer most likely to be in the students' homes."

Stanton decided to do some comparison shopping when equipping his lab, to keep the costs as low as possible. Instead of buying from one dealer, he searched a wide area and

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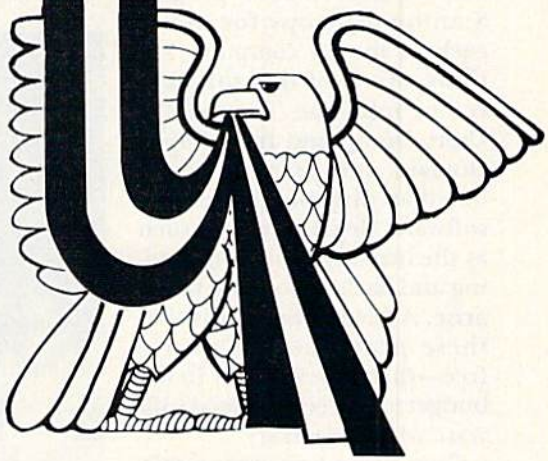

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came up with a variety of suppliers who provided different components for the Commodore systems.

As for software, he relies heavily on public domain programs. The lab's library has over 2000 programs that Stanton can copy for use at each of the 15 computer stations. Much of this software comes from the Toronto Pet Users Group and from Public Domain, Inc. Stanton points out that with public domain software, "legal questions such as site licensing, multiple loading and backup copying never arise. A second benefit is that these programs are nearly free—that leaves money in the budget to buy commercial software when necessary."

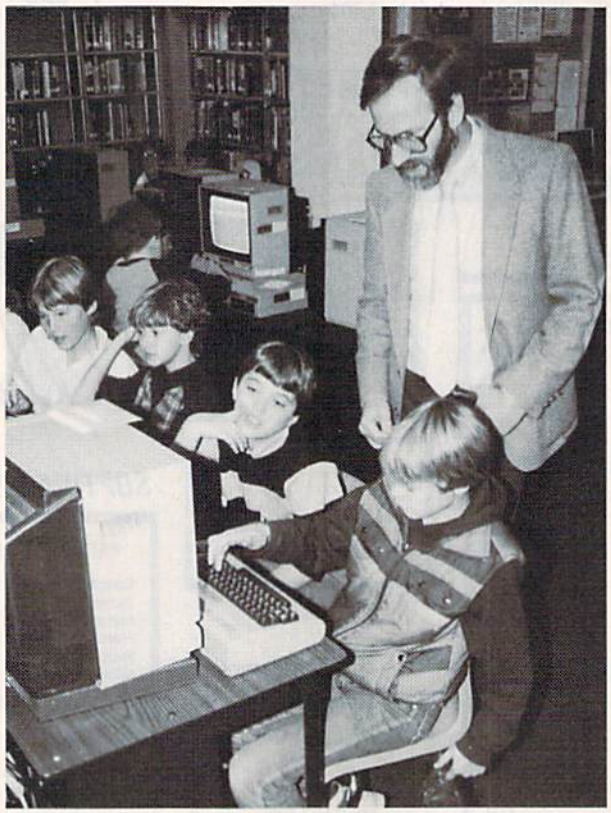
Even when he's buying software, Stanton has been able to keep costs down. He uses Easy Script for teaching word processing, and was able to get 15 copies for only $12 each from a liquidator.

Lab Organization

The 15-computer traveling lab has been in operation since November of 1985, serving the 5th and 6th graders in all nine Grand Haven elementary schools. The future plan is to create similar portable computer labs for grades 3–4, and ultimately establish a permanent lab in each school's media center, with individual computers in the classrooms as needed.

During the year, Stanton and his lab spend one month in each of the nine schools. One week before a scheduled move, he contacts the next school's principal, who has the teachers sign up for times when they can bring their classes into the lab. Every 5th and 6th grade student receives at least nine class sessions (45–55 minutes each) of formal instruction. Through the first two years of the computer literacy program, teachers are required to attend the computer lab sessions along with their students, in the hope that they'll become familiar with the machines and start using them for their own class instruction.

The computer lab is set up in the media center of each school. The media center assistant learns along with the students, and acts as a supervisor and resource person when the computer teacher and classroom teacher aren't present. This provides extra staffing for the lab, and, combined with the lab's all-day hours, encourages students to use the computers any time—during recess or free time, or in small groups when their classroom teacher gives permission.



Grand Haven school children using the traveling computer lab.

Moving Right Along

The logistics of moving an entire computer lab from one school to another might seem complicated, but Stanton has worked it out smoothly. The actual moving of the equipment is done by two men and a mid-sized moving truck.

Stanton relates that "the monitors, power supplies and electrical cords are permanently attached to 36-inch wheeled tables. When moving day comes, I unplug the keyboards and disk drives and pack sturdy cardboard boxes with about six items each. Because of their delicate nature, printers are transported in their original cartons.

"The whole setup is then moved to the next school building. In my most recent move, it took me less than two hours to pack up; less than one hour to load, move and unload; and two and a half hours to set it up." According to Stanton, there have been no problems with broken equipment during the moves.

Actually, there haven't been major problems with any aspect of the lab operation. The project is going smoothly—the perfect solution to providing each school with computers and computer instruction.

A portable computer lab with a traveling computer teacher is a unique solution to a problem that many school districts share. It enables students in all of the schools to have individual access to a computer and receive the same top-quality instruction from a specialist. It might be a workable solution for your school district.

If you would like more information about the portable computer lab and Grand Haven's computer literacy program, contact Russell Stanton, Elementary Computer Instructor, Grand Haven Public Schools, Instructional Media Services, 1415 Beech Tree St., Grand Haven, MI 49417. ®

If you're using Commodore computers for educational purposes (at home or in school) and would like to share your experiences through The Resource Center, write me a letter detailing the equipment you're using, subject areas being taught, grade level or age of your students, software you are using and any other information you feel like including.

If you'd like to donate public domain educational programs to The Resource Center for sharing with other educators and parents, please send along a disk with a brief description of the programs. Send correspondence and disks to:

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Magic

From p. 12.

combination, and from then on you can use the directory to load or run other programs. This method also allows another program on the disk to be an auto-boot program. Give the program a try. I'm sure you won't want to work without running your version of it first.

```
10 REM C-128 CUSTOMIZER - JIM BORDEN
20 COLOR0,13:COLOR4,12:CL$=CHR$(27)+"Q"+CHR
   $(13)
30 KEY 2,"DLOAD{3 CTRL Is}"+CL$
40 KEY 3,"DIRECTORY"+CL$
50 KEY 5,CHR$(29)+CHR$(20):REM CURSOR 'BLAC
   K HOLE'
60 KEY 6,"RUN{3 CTRL Is}"+CL$
70 KEY 7,"LIST"+CHR$(27)+"@"+CHR$(13)
80 PRINT"{SHFT CLR}"CHR$(14):COLOR6,2:COLOR
   5,1
90 IF RGR(0)=5THEN FAST:REM 80 COL
100 NEW
```

Jim Borden
Carlisle, PA

$355 MLBooter—If you use short Basic programs, usually called boots, to load machine language and enter a SYS command to activate the ML, there's no need to clutter your disks with a specific boot for each ML routine. You can use the program below to boot any ML of the type described above, and it will execute the appropriate SYS command automatically.

Since loading ML from Program mode does not disrupt Basic's internal pointers, it isn't necessary to use a New command. So, without reloading ML Booter, you can run it again to boot as many ML programs as you like.

The ML program's SYS address must be the first byte in the program for ML Booter to activate it. If you must access an address other than the first byte, you will need a separate boot program.

```
10 PRINT"{SHFT CLR}C-64 ML BOOTER - SUSAN C
   HARNETSKI{CRSR DN}"
20 IFA=0THENINPUT"FILENAME";F$:OPEN15,8,15
30 OPEN2,8,2,F$+",P,R":IFATHEN70
40 INPUT#15,E,E$:CLOSE2:CLOSE15:IFE=0THEN60

50 PRINTE;E$:INPUT"{CRSR DN}HIT RETURN";R$:
   RUN
60 A=1:PRINT"{CRSR DN}LOADING.":LOADF$,8,1
70 GET#2,L$,H$:CLOSE2:L=ASC(L$+CHR$(0))
80 X=L+ASC(H$+CHR$(0))*256
90 PRINTF$" ACTIVATED.":SYSX
```

Susan Charnetski
Plains, PA

$356 The way we were—Sometimes there's magic in memories. We're not old enough to long for NASA's good old days, but we will, for a while at least, miss the scene depicted in this program.

We think this C-64 program produces a pretty spectacular display. Turn up the volume on your monitor to get the full effect.

```
1 REM THE WAY WE WERE - BOB & DAVID SNADER
  - C-64
10 PRINT"{SHFT CLR}{2 CRSR DNs}THE WAY WE W
   ERE...":PRINT"{2 CRSR DNs}PRESS ANY KEY
   ";
20 V=53248:S=54273:B=3:POKE2040,13:POKE2041
   ,14:FORJ=842TO919:READK:POKEJ,K:NEXT
30 FORJ=0TO2:READK,L:POKES+K,L:NEXT:FORJ=0T
   O8:READK,L:POKEV+K,L:NEXT
40 GETK$:IFK$=""THEN40
50 FORC=9TO0STEP-1:PRINTC;"{3 CRSR LFs}";:P
   OKES+23,15:POKES+23,0:FORT=0TO950:NEXT:N
   EXT
60 FORY=245TO40STEP-1:POKEV+1,Y-40:POKEV+3,
   Y:POKEV+23,B:IFB=1THENB=3:NEXT:RUN
70 B=1:POKES+23,(Y/15)-2:POKES,Y/6:NEXT
80 DATA 16,0,0,124,0,0,254,0,8,254,32,28,25
   4,112,62,130,248,62,56,248,62,84,248
90 DATA 62,124,248,60,124,120,57,109,56,57,
   109,56,35,109,136,15,109,224,63,125
100 DATA 248,254,0,254,0,108,0,20,0,80,0,0,
    16,0,8,56,32,28,124,112,62,124,248,28
110 DATA 56,112,28,56,112,8,56,32,0,16,0,4,
    128,5,128,3,129,21,3,23,1,39,1,40,8,0
120 DATA 220,2,220,1,207,3,245,33,6
```

Bob Snader and David Snader
Baltimore, MD

**$357 Animated titles**—This routine for the C-64 adds a special touch of magic to any Basic program by animating your title screens. The program creates two substrings from a user-defined title string and animates both characters from four directions. You may have as many lines in your title as desired, each specified in the N$(X) array. However, there is one limitation. Each N$(X) string must contain exactly 26 characters. If your string is shorter, just insert spaces on either side of the string.

```
10 REM ANIMATED C-64 TITLES - PATRICK GAINE
   S
20 PRINT"{CTRL 8}{SHFT CLR}"CHR$(14):POKE53
   280,0:POKE53281,0:A$=" ":X=0
30 N$(0)="** DYNAMIC TITLE SCREEN **"
40 N$(1)="** FOR THE COMMODORE 64 **"
50 N$(2)=" CREATED BY PATRICK GAINES"
60 A=1:B=26:C=32:D=1:E=0:F=0:G=0:H=0:I=0:J=
   0:K=C:L=C:M=C:N=C:P=41:R=39
70 IFA>BTHEN170
80 G=1263+E:H=1304-F:I=1903+E:J=1944-F:N1$=
   MID$(N$(X),A,D):N2$=MID$(N$(X),B,D)
90 IFN1$=A$THENA=A+D:E=E+D:GOTO70
100 IFN2$=A$THENB=B-D:F=F+D:GOTO70
110 POKEG,K:G=G+P:K=PEEK(G):POKEG,ASC(N1$)
120 POKEH,L:H=H+R:L=PEEK(H):POKEH,ASC(N2$)
130 POKEI,M:I=I-R:M=PEEK(I):POKEI,ASC(N1$)
140 POKEJ,N:J=J-P:N=PEEK(J):POKEJ,ASC(N2$)
150 IFG>=ITHENA=A+D:B=B-D:E=E+D:F=F+D:K=C:L
    =C:M=C:N=C:GOTO70
160 GOTO110
170 FORS=0TO2:SYS59626:NEXT:X=X+1:IFN$(X)<>
    ""THEN60
180 REM ** PLACE REST OF PROGRAM HERE **
```

Patrick Gaines
Gastonia, NC

$358 The white hole—This neat little subroutine prints any 38-character message from the center of the screen to the edges in a very fancy way. The printing sequence is just the opposite of a black hole. The first and last letters are printed, then the second and next-to-last letters, and so on, working outward from the center.

```
1Ø REM C-64/C-128 WHITE HOLE - ERIC J. BRUN
   O
2Ø PRINT"{SHFT CLR}":POKE5328Ø,Ø:POKE53281,
   Ø
3Ø M$="{CTRL 9}{CTRL 3}{3 SPACEs}THIS IS TH
   E 'WHITE HOLE' TRICK{3 SPACEs}":PL$="{HO
   ME}{8 CRSR DNs}":GOSUB1ØØØØ
4Ø M$="{CTRL 9}{CTRL 2}INSERT NEW TEXT IN L
   INES 3Ø,4Ø,& 5Ø.":PL$=PL$+"{2 CRSR DNs}"
   :GOSUB1ØØØØ
5Ø M$="{CTRL 9}{COMD 7}{6 SPACEs}PRESS ANY
   KEY TO CONTINUE.{4 SPACEs}":PL$=PL$+"{2
   CRSR DNs}":GOSUB1ØØØØ
6Ø GETA$:IFA$=""THEN6Ø
7Ø END
1ØØØØ L=LEN(M$):MI=38-L/2:FORI=1TOLEN(M$)-1
      9
1ØØ1Ø PRINTPL$SPC(MI)LEFT$(M$,I)RIGHT$(M$,L
      -(L-I)):MI=MI-1:NEXT:RETURN
```

Eric J. Bruno
Shirley, NY

$359 Songs in the key of C—The C-128's SID chip has great music capabilities and the ease of programming provided by Basic 7.0. There is one slight drawback, though. If you program a song using the default note values in SID, your song will be in the key of F instead of in the key of C. That means you cannot accompany your 128 on the keyboard or piano without first transposing the music.

The accompanying program will play the default scale, then a C scale using the Sound command to demonstrate the difference between the two scales.

```
1 REM GIVE ME A C - NEAL SMITH - C-128
1Ø TEMPO 8
2Ø PLAY"V1O4T7U15XØCDEFGABO5C":SLEEP1
3Ø READA:SOUND1,A,3Ø:IFA=ØTHENEND:ELSEGOTO3
   Ø
4Ø DATA4297,4822,5412,5724,6429,7217,81Ø2,8
   578,Ø
```

Neal Smith
Rochester, NY

$35A From the Grand Ole Opera—My program plays "The Marines Hymn," which was written in 1868 for an opera by Jacques Offenbach. I've converted it to C-128 Basic. I hope you enjoy it.

```
1Ø REM GRAND OPERA C-128 - JESSE B BROWN
2Ø TEMPO 31:PLAY"V1O4TØU15XØ":PLAY"V2O3TØU1
   5XØ"
3Ø A$="V1O4.QEV2Ø3.QEQFV1O4QFMHGV2O3HFHFV1O
   4HGMQFV2O3QF.HDV1O4.HDMWCV2O3WEMV1Ø4HBV2
   O3$HFHRV1O4.QCQEM"
4Ø B$="V1O4HGV2O3HGHGV1O4HGMHGV2O3HGHGV1O4H
   GMWGV2O3HEV2O2HEMV1O4HGV2O2HAHAV1O4.QEQF
   MHGV2O3HCHCV1O4HGM"
5Ø C$="V1O4QFV2O3QD.HFV1O4.HDMWCV2O3HCV2O2H
   BMV1O4HCV2O2QAQGV1O4.QCIEMHGV2O3HGHGV1O4
   HGMHGV2O3HFHFV1O4HGM"
6Ø D$="V1O4.HGV2O3HCO2HBV1O5QCMO4HGV2O2HAHG
   V1O4.QEIFMHGV2O3HCHCV1O4HGQFV2O3QD.HFV1O
   4.HDMWCV2O3HCO2HBM"
7Ø E$="V1O4HCV2O2HAHGV1O5.QCO4IBMHAV2O2HFO3
   HCV1O4HFMHAV2O3HFO2HFV1O4HFM.HGV2O3HCO2H
   BV1O4QAMHGV2O2HAHGV1O5.QCO4IBM"
8Ø F$="V1O4HAV2O2HFO3HCV1O4HFMWAV2O3HFHCMO4
   V2O3HGV1O4WGV2O3HBMV1O4QGV2O3$QBV1O4QRV2
   O3QRV1O4.QCV2O3HRV1O4IEM"
9Ø G$="V1O4HGV2O3HGHGV1O4HGMHGV2O3HFHFV1O4H
   GM.HGV2O3HCO2HBV1O5QCMO4HGV2O2HAHGV1O4.Q
   EIFM"
1ØØ H$="V1O4HGV2O3HCHCV1O4HGMQFV2O3QD.HFV1O
    4.HDMV2O3.QCV1O4WCO2IGQAQGQEMV1O4QCV2O2
    QCQRV1O4QRO5QCV2O2QCQRV1O4QRM"
11Ø PLAYA$:PLAYB$:PLAYC$:PLAYD$:PLAYE$:PLAY
   F$:PLAYG$:PLAYH$
```

Jesse B. Brown
Eunice, LA

$35B Shake it up, baby!—Try running this short and simple program for an earth-shaking surprise:

```
1Ø REM SHAKE IT UP - HAZMAN HALID - C-64
2Ø POKE5328Ø,Ø:POKE53281,Ø:INPUT "FRICTION
   (1-7)";F
3Ø FOR R=1 TO 2ØØ:PRINT "SHAKE";:NEXT
4Ø FOR R=Ø TO 15 STEP F:POKE5327Ø,R:NEXT
5Ø FOR R=15 TO Ø STEP -F:POKE5327Ø,R:NEXT
6Ø GOTO4Ø
```

Input a 1 for a sliding effect or a 7 for a good shake! To smooth the slide, just add :POKE 56325,1 to the end of line 20. Press the run/stop key to quit and run/stop-restore to exit the program.

Hazman Halid
West Malaysia

$35C A plane joy—The following program creates an airplane and stores it as sprites. You can then move the airplane in three directions with a joystick in port 2. This program could provide the groundwork for a simple game.

```
1Ø REM C-128 PLANE JOY - DAVID ZAJAC
15 GRAPHIC1
2Ø SCNCLR 1:BOX 1,1,1,29,29
3Ø DRAW1,5,11TO5,12
4Ø DRAW1,4,12TO9,12TO8,11
5Ø DRAW1,24,12TO24,14
6Ø DRAW1,21,11TO24,11TO24,9TO23,8TO25,8
7Ø DRAW1,21,1ØTO23,8
8Ø BOX 1,23,1Ø,24,12:BOX1,22,14,25,15:BOX1
   3,13,4,14
9Ø DRAW1,6,1ØTO9,1ØTO1Ø,11TO11,11TO12,12TO2
   Ø,12
```

→

Listing continued.

```
100 DRAW1,21,15TO18,15TO17,14TO11,14TO10,15
    TO5,15
110 DRAW1,11,16TO17,16
120 SSHAPEA$,3,7,25,30:SPRSAVA$,1:SPRITE1,1
    ,1
130 BOX0,0,0,30,30,,1:MOVSPR1,150,100:DO
140 IFJOY(2)=6THENMOVSPR1,260 #10
150 IFJOY(2)=7THENMOVSPR1,270 #10
160 IFJOY(2)=8THENMOVSPR1,280 #10
170 IFJOY(2)>127THENMOVSPR1,0 #0:ELSE:LOOP
```

David Zajac
Alhambra, IL

$35D No-fade colors—This program lets you select screen colors to replace the standard blues on the C-64. The program remembers the new colors until the computer is reset or turned off. Use F1, F3 and F5 to cycle through the text, background and border colors, respectively. Printed text will always be visible because the program automatically sets a selection to the next color if text and background colors are the same.

When you've selected your colors, press F7. If all has gone well, the run/stop-restore combination won't destroy your colors, and even if you run a program that changes the colors, they'll return when the program ends.

```
10 REM NO-FADE C-64 COLORS-J.R.CHARNETSKI
20 FORJ=1TO23:READN:T=T+N:NEXT:RESTORE
30 IFT<>108865THENPRINT"DATA ERROR":END
40 READM,B,T,W:POKET+4,128:X=15:Y=7:S=X
50 PRINT"{SHFT CLR}":FORJ=MTOM+N:READA:POKE
   J,A
60 NEXT:POKET,X-1:POKEB,X-1:POKEB+1,Y-1
70 PRINT"{HOME}{2 CRSR DNs}F1 TEXT":IFX>STH
   ENX=0
80 PRINT"{CRSR DN}F3 BACKGROUND":IFY>STHENY
   =0
90 PRINT"{CRSR DN}F5 BORDER":IFZ>STHENZ=0
100 PRINT"{CRSR DN}F7 COLORS OK"
110 GETA$:IFA$=""THEN110
120 IFA$="{FUNCT 1}"THENPOKE T,X:X=X+1
130 IFA$="{FUNCT 3}"THENPOKE B+1,Y:Y=Y+1
140 IFA$="{FUNCT 5}"THENPOKE B,Z:Z=Z+1
150 IFX=YTHEN120
160 IFA$<>"{FUNCT 7}"THEN70
170 POKEM+1,PEEK(B):POKEM+6,PEEK(B+1)
180 POKEM+11,PEEK(T):POKET+4,0
190 POKEW,232:POKEW+1,203:PRINT"{SHFT CLR}"
    :NEW
200 DATA 52200,53280,646,770,169,014,141
210 DATA 032,208,169,006,141,033,208,169
220 DATA 014,141,134,002,076,131,164,017
```

Joseph R. Charnetski
Dallas, PA

$35E Foreign exchange—Here's a nifty little program that prints a conversion chart for U.S. and foreign currency. Look in the business section of your newspaper for the foreign exchange rates. Find what one U.S. dollar is worth in a foreign currency and enter that value at the prompt. The program then prints the values for one dollar to $50. To print higher amounts, change the value in the loop in line 50.

```
10 REM C-64/C-128 FOREIGN EXCHANGE - CHAD J
   ONES
20 INPUT "$1.00 US=";C1:C2=1/C1:C1=C1*100
30 OPEN4,4
40 PRINT#4,"{4 SPACEs}AMERICAN ${2 SPACEs}=
   {2 SPACEs}FOREIGN{2 SPACEs}${5 SPACEs}FO
   REIGN ${2 SPACEs}={2 SPACEs}AMERICAN $"
50 FORT=1TO50
60 A=INT(T*C1+.5)/100:F=INT(T*C2*100+.5)/10
   0
70 PRINT#4,"{6 SPACEs}"T"{10 SPACEs}"A"{10
   SPACEs}"T"{10 SPACEs}"F
80 NEXT:CLOSE4
```

Chad Jones
San Gabriel, CA

$35F New Okimate 10 manual—If you bought one of the first Okimate 10 color printers, here's good news: The manufacturer has revised the original operator's manual.

Information that was confusing is much clearer in the new edition, and details for using some popular word processors have been added.

To determine which version of Okimate 10 you have, look at the manual's cover. The original manual is called *Printer Handbook* and has a photograph on the cover. The new manual has been retitled *Printer Manual* and has a drawing on the cover.

I called Okidata's toll-free number (1-800-OKIDATA), and they mailed the updated version to me.

C. Finke
Evansville, IN

**$360 Quiet, please**—At power-up or after pressing the restore key or reset button on my C-128, I was getting background hum from the monitor speaker. I found that by typing CHR$(7) or pressing CTRL-G, a short tone will sound, followed by silence. No more humming!

Rodney Sweeney
Montpelier, VT

$361 Easier filenames—It is common practice to save long programs several times while typing them in. Each version is usually named "program#". Rather than add the number to the end of the name, try adding it to the beginning (e.g., "4program"). By doing so, you can load the file with the number and first few characters followed by a wild card (e.g., "4pro*") instead of typing the entire name and the number.

Save the final version without a number in it, and you can scratch all old versions with "S0:?program".

Jason Lee
Macomb, OK

$362 Checking lines with C-128 Perfect Typist—To check programs entered without the 128 Perfect Typist, first load and run 128 Perfect Typist. Then enter the following line and press return:

```
10 REM CHECKING FOR C-128 PERFECT TYPIST -
   JOSEPH FAUST, JR.
20 REM ENTER LINE 30 WITHOUT LINE NUMBER
30 A$=CHR$(148):B$=CHR$(145):KEY7,CHR$(27)+
   "J"+A$+A$+A$+A$+"LIST"+CHR$(13)+B$+B$+B$
   +B$+CHR$(13)
```

Next, load the program you wish to check and type AUTO followed by the line number increment used in the program to be checked. List the first line of the program, move the cursor up to the listed line and press return. This will give you the checksum for that line followed by the line number for the next line. Press F7, and the next line will be listed, along with the checksum for that line followed by the next line number. If you continue to press F7, you can step right through the program. As a side benefit, pressing F7 without a line number lists the program.

Joseph V. Faust, Jr.
Lompoc, CA

$363 Double-sided disaster—I wonder how many other new 1571 owners have erased a full side of perfectly good programs. This was a result of attempting to format the "flip side" using the Format Disk program included on the 1571 test/demo disk. The problem is, this program only formats disks as double-sided and thus erases whatever is on both sides of the disk.

The Format Disk program can be made safer and more versatile by deleting line 90 and adding the following four lines:

```
1 REM DOUBLE SIDE 1571 TEST/DEMO PROGRAM EN
  HANCEMENT - CHRIS MORRY
141 INPUT"SINGLE (S) OR DOUBLE (D) SIDED";S
    S$
142 IF SS$<>"D"THEN OPEN 15,8,15,"UO>M0":CL
    OSE15:GOTO150
143 OPEN15,8,15,"U0>M1":CLOSE15
269 OPEN15,8,15,"U0>M1":CLOSE15
```

These minor changes let you choose single- or double-sided formats. Line 269 restores your 1541 to a 1571.

Criss Morry
Moncton, N.B.
Canada

$364 Faster hi-res dumps—If you use a Cardco +G or G-Wiz interface, you may be experiencing some printing delays. The print buffer is so small on these interfaces that they are not able to quickly do hi-res printing. This can make printing with programs such as The Newsroom or Print Shop very time-consuming. A solution (other than a new interface) is a new ROM chip. Romco (PO Box 18359, Wichita, KS 67218; phone 316-687-6502) has replacement ROM chips for the Cardco interfaces at a fraction of the cost of a new interface. The chips are simple to install and will speed printing by *1500%*! I'm now using a replacement ROM chip for my printer interface, and it has put new life into my printing.

Jay Knott
Huntington Beach, CA

$365 Which wire is which?—Did you ever want to disconnect just *one* device from your surge protector in order to move it from one place to another? Did you have to go through the tedious task of tracing the appropriate wire to the surge protector? Here's a trick that will make your task a little easier.

Almost everyone owns a label maker that churns out plastic stick-on labels. Attach to the wire or cable near the base of the plug a short piece of label with the device name printed on it. Then finding the plug will be a snap.

Eric Pickell
Palatine, IL

$366 Hankey-Pankey—If your printer is like mine, it requires more than an 80-character line to set up the printer the way I like. This short set of printer commands eliminates the need to type that data each time you want a printout.

Add the lines shown below with line numbers lower than the first line number in your program. List the first few lines and move the cursor to the O in OPEN; then press the delete key until the O and the cursor are in the first column. Erase the REM statement in the next line the same way. Next, press return and—*voila!*—your printer lists the program just the way you like it.

To avoid typing this line at the beginning of your old programs, use tip 5 described in Magic trick $2E9 (May 1986). C-64 owners may have to use two lines because of the 80-character limit.

```
0 REM EASY C-64/C-128 HARDCOPY - LARRY PANK
  EY
4 REM OPEN1,4:PRINT#1,CHR$(27)"C"CHR$(66)CH
  R$(27)"N"CHR$(6):CMD1:LIST
5 REM PRINT#1,CHR$(12);:CLOSE1
```

Larry Pankey
Dana Point, CA

$367 Printer stands—Here's how to get an inexpensive printer stand. You can use an old TV or microwave stand to hold your printer and paper. If it has wheels, it will be easy to move around. If it has only two bars for the top shelf, so much the better if your printer feeds from the bottom. The paper is stored on the bottom shelf. If you don't have a TV stand, scan the merchandise section of your newspaper's classified ads.

Chuck Moody
Milledgeville, GA ■

From p. 43.

```
52 DE=Ø                          :REM*162
54 PRINTCU$(PA);                 :REM*66
56 DE=DE+1                       :REM*2
6Ø GETG$                         :REM*62
61 IFG$=CHR$(34)THEN6Ø           :REM*43
62 IFG$<>""THEN7Ø                :REM*172
65 IFDE<24THEN54                 :REM*227
68 PA=3-PA                       :REM*118
7Ø IFG$=CHR$(29)THENIFC<27THENC=
   C+1:GOSUB1ØØØØ:GOTO3Ø         :REM*58
71 IFG$=CHR$(145)THENIFRD>ØTHENR
   D=RD-1:GOSUB1ØØØØ:GOTO3Ø
                                 :REM*65
72 IFG$=CHR$(19)THENC=Ø:RD=Ø:GOT
   O99ØØ                         :REM*254
73 IFG$="{LEFT ARROW}"THEN22ØØØ
                                 :REM*99
74 IFG$=CHR$(147)THEN35Ø         :REM*86
75 IFG$=CHR$(17)THENIFRD<6THENRD
   =RD+1:GOSUB1ØØØØ:GOTO3Ø
                                 :REM*193
76 IFG$=CHR$(29)ORG$=CHR$(145)OR
   G$=CHR$(17)THEN6Ø             :REM*116
77 IFG$=CHR$(136)AND(PEEK(53281)
   AND15)<15THENPOKE53281,(PEEK(
   53281)+1):GOTO6Ø              :REM*7
78 IFG$=CHR$(136)AND(PEEK(53281)
   AND15)=15THENPOKE53281,Ø:GOTO
   6Ø                            :REM*12
79 IFG$=CHR$(137)THEN4ØØ         :REM*55
8Ø IFG$=CHR$(157)THENIFC>ØTHENC=
   C-1:GOSUB1ØØØØ:GOTO3Ø         :REM*6
81 IFG$=CHR$(133)THENPRINTCHR$(1
   8);"F";CHR$(146);:GOTO14Ø
                                 :REM*27
82 IFG$=CHR$(139)THEN13ØØØ
                                 :REM*5Ø
83 IFG$=CHR$(14Ø)AND(PEEK(5328Ø)
   AND15)=15THENPOKE5328Ø,Ø:GOTO
   6Ø                            :REM*227
84 IFG$=CHR$(14Ø)AND(PEEK(5328Ø)
   AND15)<15THENPOKE5328Ø,PEEK(5
   328Ø)+1:GOTO6Ø                :REM*248
85 IFG$=CHR$(134)THEN24ØØØ
                                 :REM*131
86 IFG$=CHR$(138)THEN25ØØØ
                                 :REM*212
87 IFG$=CHR$(135)THEN134ØØ
                                 :REM*41
9Ø IFG$=CHR$(13)THEN3ØØ          :REM*32
1ØØ IFG$=CHR$(2Ø)THEN2ØØ         :REM*2Ø
125 IFLEN(IN$)>3ØTHEN52          :REM*163
13Ø PRINTG$;                     :REM*2Ø4
14Ø IN$=IN$+G$                   :REM*24Ø
199 GOTO52                       :REM*187
2ØØ IFLEN(IN$)=ØTHEN6Ø           :REM*94
21Ø IFLEN(IN$)=1THENPRINTCHR$(2Ø
   );:GOTO5Ø                     :REM*66
22Ø IN$=LEFT$(IN$,LEN(IN$)-1):PR
   INTCHR$(2Ø);                  :REM*2
23Ø GOTO6Ø                       :REM*194
3ØØ IFLEFT$(IN$,1)<"A"ORLEFT$(IN
   $,1)>"Z"THEN2ØØØØ             :REM*43
3Ø5 IFMID$(IN$,2,1)<"Ø"ORMID$(IN
   $,2,1)>"9"THEN2ØØØØ           :REM*154
3Ø6 IFMID$(IN$,3,1)<"Ø"ORMID$(IN
   $,3,1)>":"THEN2ØØØØ           :REM*223
31Ø IFVAL(MID$(IN$,2,2))<ØORVAL(
   MID$(IN$,2,2))>29THEN2ØØØØ
                                 :REM*221
32Ø IFMID$(IN$,3,1)<>":"ANDMID$(
   IN$,4,1)<>":"THEN2ØØØØ
                                 :REM*125
33Ø GOTO5ØØ                      :REM*37
35Ø GOSUB125ØØ:IFG$="N"THEN99ØØ
                                 :REM*57
355 GOSUB1255Ø                   :REM*84
36Ø FORR=ØTO25:FORCD=ØTO29
                                 :REM*221
37Ø DA$(R,CD)="":FC$(R,CD)="":DA
   (R,CD)=Ø                      :REM*93
38Ø NEXT:NEXT:Z=Ø                :REM*233
39Ø GOTO99ØØ                     :REM*29
4ØØ PRINTCHR$(19);:PRINT:REM*213
41Ø PRINTCHR$(18);" MAXIMUM PREC
   ISION (Ø TO 6) PRESS KEY "
                                 :REM*17
42Ø GETG$:IFG$<"Ø"ORG$>"6"THEN42
   Ø                             :REM*171
43Ø P=1Ø{UP ARROW}VAL(G$)
                                 :REM*191
44Ø GOTO99ØØ                     :REM*79
5ØØ GOSUB12ØØØ                   :REM*3
52Ø IFMID$(IN$,3,1)=":"THENS=4:G
   OTO54Ø                        :REM*172
53Ø IFMID$(IN$,4,1)=":"THENS=5
                                 :REM*24Ø
54Ø IFMID$(IN$,S,1)=CHR$(133)THE
   N2ØØØ                         :REM*176
55Ø IFMID$(IN$,S,1)=""THENDA$(R,
   CD)="":DA(R,CD)=Ø:GOTO99ØØ
                                 :REM*182
145Ø IFFC$(R,CD)<>""THENGOTO11ØØ
   Ø                             :REM*53
15ØØ T$=MID$(IN$,S,1)            :REM*155
151Ø IFT$<"Ø"ORT$>"9"THENIFT$<>"
   +"ANDT$<>"-"THEN156Ø:REM*95
1512 DA(R,CD)=VAL(MID$(IN$,S,19)
   )                             :REM*111
1513 DA$(R,CD)=MID$(IN$,S,19)
                                 :REM*224
1515 IFLEN(DA$(R,CD))=9THEN159Ø
                                 :REM*222
1518 IFLEN(DA$(R,CD))>9THEN158Ø
                                 :REM*79
152Ø FORX=1TO9-LEN(DA$(R,CD))
                                 :REM*55
153Ø DA$(R,CD)=" "+DA$(R,CD)
                                 :REM*119
154Ø NEXT                        :REM*2Ø
1545 GOTO99ØØ                    :REM*165
156Ø DA$(R,CD)=MID$(IN$,S,9):GOT
   O99ØØ                         :REM*132
158Ø DA$(R,CD)="*********"
                                 :REM*54
159Ø GOTO99ØØ                    :REM*21Ø
2ØØØ IFMID$(IN$,S+1,1)="T"ANDLEN
   (IN$)=S+1THEN2Ø1Ø             :REM*2Ø3
2Ø05 GOTO2Ø2Ø                    :REM*234
2Ø1Ø IFCD<>ØANDR<>ØTHEN2ØØØØ
                                 :REM*3
2Ø15 Z=1:CT=CD:RT=Ø:GOTO99ØØ
                                 :REM*21Ø
2Ø2Ø IFMID$(IN$,S+1,1)="O"ANDLEN
   (IN$)=S+1THEN2Ø3Ø             :REM*217
2Ø25 GOTO2Ø4Ø                    :REM*62
2Ø3Ø Z=Ø:GOTO99ØØ                :REM*153
2Ø4Ø IFMID$(IN$,S+1,3)="SUM"THEN
   GOSUB14ØØØ:GOTO99ØØ:REM*1Ø3
2Ø5Ø IFMID$(IN$,S+1,3)="MIN"THEN
   GOSUB14ØØØ:GOTO99ØØ           :REM*62
2Ø6Ø IFMID$(IN$,S+1,3)="MAX"THEN
   GOSUB14ØØØ:GOTO99ØØ:REM*12Ø
2Ø7Ø IFMID$(IN$,S+1,3)="AVG"THEN
   GOSUB14ØØØ:GOTO99ØØ           :REM*54
2Ø8Ø IFMID$(IN$,S+1,3)="COP"THEN
   GOSUB14ØØØ:GOSUB26Ø1Ø:GOTO2
   Ø85                           :REM*126
2Ø81 GOTO211Ø                    :REM*39
2Ø85 IFR1=R2THEN21ØØ             :REM*91
2Ø88 FORX=R1TOR2                 :REM*194
2Ø9Ø DA(X,C1)=DA(R,CD):DA$(X,C1)
   =DA$(R,CD)                    :REM*146
2Ø95 NEXT:GOTO99ØØ               :REM*1Ø5
21ØØ FORX=C1TOC2                 :REM*222
2103 DA(R1,X)=DA(R,CD):DA$(R1,X)
   =DA$(R,CD)                    :REM*149
2106 NEXT:GOTO99ØØ               :REM*116
211Ø IFMID$(IN$,S+1,1)="C"ANDLEN
   (IN$)=S+1THEN212Ø             :REM*28
2115 GOTO213Ø                    :REM*137
212Ø GOSUB125ØØ                  :REM*254
2125 IFG$="N"THENGOTO99ØØ:REM*13
2128 DA(R,CD)=Ø:DA$(R,CD)="":FC$
   (R,CD)="":GOTO99ØØ :REM*132
213Ø IFMID$(IN$,S+1,1)="V"ANDLEN
   (IN$)=S+1THEN214Ø             :REM*9Ø
2135 GOTO215Ø                    :REM*221
214Ø GOSUB126ØØ:GOTO99ØØ :REM*56
2145 GOTO99ØØ                    :REM*255
215Ø IFMID$(IN$,S+1,1)="J"ANDLEN
   (IN$)=S+1THEN216Ø             :REM*9Ø
2155 GOTO25ØØ                    :REM*145
216Ø C=VAL(MID$(IN$,2,2)):IFC>27
   THENC=27                      :REM*252
2162 IFASC(LEFT$(IN$,1))>84THENR
   D=6                           :REM*26
2163 IFASC(LEFT$(IN$,1))<=84THEN
   RD=Ø                          :REM*1Ø9
2165 GOTO99ØØ                    :REM*19
2175 IFMID$(IN$,S+1,1)<"A"ORMID$
   (IN$,S+1,1)>"Z"THEN2ØØØØ
                                 :REM*19
2185 IFMID$(IN$,S+2,1)<"Ø"ORMID$
   (IN$,S+2,1)>"9"THEN2ØØØØ
                                 :REM*136
251Ø IFVAL(MID$(IN$,S+2,2))<ØORV
   AL(MID$(IN$,S+2,2))>29THEN2
   ØØØØ                          :REM*147
258Ø T$=MID$(IN$,S+3,1)          :REM*132
259Ø IFT$="+"ORT$="-"ORT$="*"ORT
   $="/"ORT$="{UP ARROW}"THEN2
   65Ø                           :REM*15Ø
26ØØ T$=MID$(IN$,S+4,1)          :REM*184
261Ø IFT$="+"ORT$="-"ORT$="*"ORT
   $="/"ORT$="{UP ARROW}"THEN2
   67Ø                           :REM*172
262Ø GOTO2ØØØØ                   :REM*44
265Ø S1=S+4:GOTO268Ø             :REM*232
267Ø S1=S+5                      :REM*42
268Ø IFMID$(IN$,S1,1)<"A"ORMID$(
   IN$,S1,1)>"Z"THEN3ØØØ
                                 :REM*2Ø
269Ø IFMID$(IN$,S1+1,1)<"Ø"ORMID
   $(IN$,S1+1,1)>"9"THEN2ØØØØ
                                 :REM*92
27ØØ IFVAL(MID$(IN$,S1+1,2))<ØOR
   VAL(MID$(IN$,S1+1,2))>29THE
   N2ØØØØ                        :REM*234
271Ø GOTO31ØØ                    :REM*134
3ØØØ IFT$="/"ANDVAL(MID$(IN$,S1,
   19))=ØTHEN2ØØØØ               :REM*125
31ØØ FC$(R,CD)=MID$(IN$,S,19)
                                 :REM*5Ø
99ØØ GOSUB1ØØØØ                  :REM*192
991Ø PRINTCHR$(19);              :REM*7Ø
9999 GOTO5Ø                      :REM*1Ø
1ØØØØ PRINTCHR$(147)             :REM*87
1ØØ1Ø PRINTCHR$(18);"{4Ø SPACEs}
   "                             :REM*55
1ØØ15 IFZ=1THENPRINTTAB(5);CT;TA
   B(16);C+1;TAB(27);C+2:GOTO
   1ØØ21                         :REM*Ø
1ØØ2Ø PRINTTAB(5);C;TAB(16);C+1;
   TAB(27);C+2                   :REM*179
1ØØ21 IFZ=1THEN1ØØ26             :REM*42
1ØØ22 PRINTCHR$(65+RD);:PRINTTAB
   (2);DA$(RD,C);                :REM*249
1ØØ23 PRINTTAB(13);DA$(RD,C+1);
                                 :REM*178
1ØØ24 PRINTTAB(24);DA$(RD,C+2)
                                 :REM*11
1ØØ25 GOTO1ØØ3Ø                  :REM*238
1ØØ26 PRINTCHR$(65+RT);:PRINTTAB
   (2);DA$(RT,CT);               :REM*247
1ØØ27 PRINTTAB(13);DA$(RT,C+1);
                                 :REM*184
1ØØ28 PRINTTAB(24);DA$(RT,C+2)
                                 :REM*17
1ØØ3Ø FORR=RD+1TORD+19           :REM*2Ø9
1ØØ4Ø PRINTCHR$(65+R);           :REM*127
1ØØ45 IFZ=1THENPRINTTAB(2);DA$(R
   ,CT);:GOTO1ØØ6Ø               :REM*42
1ØØ5Ø PRINTTAB(2);DA$(R,C);
```

```
                        :REM*245
1ØØ6Ø PRINTTAB(13);DA$(R,C+1);
                        :REM*51
1ØØ7Ø PRINTTAB(24);DA$(R,C+2)
                        :REM*129
1ØØ8Ø NEXT              :REM*145
1ØØ9Ø RETURN            :REM*2Ø3
11ØØØ PRINTCHR$(19);:PRINT
                        :REM*1Ø2
11ØØ5 PRINTCHR$(18);"PROTECTED F
      ORMULA{2 SPACEs}";FC$(R,CD
      )                 :REM*17
11Ø1Ø GETG$:IFG$=""THEN11Ø1Ø
                        :REM*183
11Ø2Ø GOTO2Ø             :REM*243
12ØØØ R=ASC(LEFT$(IN$,1))-65
                        :REM*12Ø
12Ø1Ø CD=VAL(MID$(IN$,2,2))
                        :REM*92
12Ø2Ø RETURN            :REM*92
125ØØ PRINTCHR$(19);:PRINT
                        :REM*72
125Ø5 PRINTCHR$(18);" ARE YOU SU
      RE PRESS 'Y' OR 'N' "
                        :REM*151
1251Ø GETG$:IFG$<>"Y"ANDG$<>"N"T
      HEN1251Ø          :REM*156
1252Ø RETURN            :REM*82
1255Ø PRINTCHR$(19);:PRINT
                        :REM*123
12555 PRINTCHR$(18);" WORKING{4
      SPACEs}PLEASE WAIT...{8 SP
      ACEs}"            :REM*82
1256Ø RETURN            :REM*123
126ØØ PRINTCHR$(19);:PRINT
                        :REM*173
126Ø5 PRINTCHR$(18);    :REM*152
126Ø6 IFFC$(R,CD)<>""THENPRINT"F
      ORM. ";FC$(R,CD);" - ";
                        :REM*119
126Ø7 PRINT"VAL.";DA(R,CD)
                        :REM*1Ø2
1261Ø GETG$:IFG$=""THEN1261Ø
                        :REM*65
1262Ø RETURN            :REM*183
13ØØØ PRINTCHR$(19);:PRINT
                        :REM*62
13ØØ5 PRINTCHR$(18);"PRESS 'SPAC
      E' TO PRINT-'RETURN' TO EX
      IT"               :REM*129
13Ø1Ø GETG$:IFG$<>CHR$(32)ANDG$<
      >CHR$(13)THEN13Ø1Ø:REM*218
13Ø2Ø IFG$=CHR$(13)THEN99ØØ
                        :REM*11Ø
13Ø3Ø OPEN4,4           :REM*128
13Ø4Ø R=Ø:CD=Ø           :REM*82
13Ø5Ø IFFC$(R,CD)<>""THEN13Ø8Ø
                        :REM*116
13Ø6Ø CD=CD+1:IFCD=3ØTHENCD=Ø:R=
      R+1:IFR=26THEN133ØØ:REM*15
13Ø7Ø GOTO13Ø5Ø          :REM*145
13Ø8Ø PRINT#4,CHR$(R+65);CD;
                        :REM*61
13Ø9Ø PRINT#4,CHR$(16)"Ø6";FC$(R
      ,CD);             :REM*171
131ØØ CD=CD+1:IFCD=3ØTHENCD=Ø:R=
      R+1:IFR=26THEN133ØØ:REM*55
1311Ø IFFC$(R,CD)<>""THEN1314Ø
                        :REM*121
1312Ø CD=CD+1:IFCD=3ØTHENCD=Ø:R=
      R+1:IFR=26THEN133ØØ:REM*75
1313Ø GOTO1311Ø          :REM*235
1314Ø PRINT#4,CHR$(16)"2Ø";CHR$(
      R+65);CD;         :REM*79
1315Ø PRINT#4,CHR$(16)"26";FC$(R
      ,CD);             :REM*247
1316Ø CD=CD+1:IFCD=3ØTHENCD=Ø:R=
      R+1:IFR=26THEN133ØØ
                        :REM*115
1317Ø IFFC$(R,CD)<>""THEN132ØØ
                        :REM*125
1318Ø CD=CD+1:IFCD=3ØTHENCD=Ø:R=
      R+1:IFR=26THEN133ØØ
                        :REM*135
1319Ø GOTO1317Ø          :REM*169
132ØØ PRINT#4,CHR$(16)"4Ø";CHR$(
      R+65);CD;         :REM*155
1321Ø PRINT#4,CHR$(16)"46";FC$(R
      ,CD);             :REM*67
1322Ø CD=CD+1:IFCD=3ØTHENCD=Ø:R=
      R+1:IFR=26THEN133ØØ
                        :REM*175
1323Ø IFFC$(R,CD)<>""THEN1326Ø
                        :REM*25
1324Ø CD=CD+1:IFCD=3ØTHENCD=Ø:R=
      R+1:IFR=26THEN133ØØ
                        :REM*195
1325Ø GOTO1323Ø          :REM*3
1326Ø PRINT#4,CHR$(16)"6Ø";CHR$(
      R+65);CD;         :REM*231
1327Ø PRINT#4,CHR$(16)"46";FC$(R
      ,CD)              :REM*67
1328Ø GOTO13Ø6Ø          :REM*163
133ØØ PRINT#4,CHR$(1Ø)    :REM*9
1331Ø PRINT#4            :REM*53
1332Ø CLOSE4:GOTO99ØØ    :REM*176
134ØØ PRINTCHR$(147):PRINT"{1Ø S
      PACEs}PRINT SPREADSHEET"
                        :REM*1Ø
1341Ø PRINT:PRINT        :REM*1Ø4
1342Ø PRINT"{5 SPACEs}ENTER THE
      TOP LEFT CELL     :REM*232
1343Ø PRINT"{9 SPACEs}TO BE PRIN
      TED OR            :REM*92
1344Ø PRINT"{6 SPACEs}PRESS 'RET
      URN' TO EXIT"     :REM*114
1345Ø PRINT:G$=""        :REM*2Ø6
1346Ø INPUT"{14 SPACEs}";G$:IFG$
      =""THEN99ØØ       :REM*24
13465 IFG$<"AØ"ORG$>"Z9"THEN134Ø
      Ø                 :REM*55
13467 R1=ASC(LEFT$(G$,1))-65:TC=
      VAL(MID$(G$,2)):IFTC>29THE
      N134ØØ            :REM*193
1347Ø PRINTCHR$(147):PRINT"{1Ø S
      PACEs}PRINT SPREADSHEET"
                        :REM*8Ø
13472 PRINT:PRINT        :REM*166
13474 PRINT"{4 SPACEs}ENTER THE
      BOTTOM RIGHT CELL :REM*11Ø
13476 PRINT"{9 SPACEs}TO BE PRIN
      TED OR            :REM*138
13478 PRINT"{6 SPACEs}PRESS 'RET
      URN' TO EXIT"     :REM*152
1348Ø PRINT:T$=""        :REM*19Ø
13482 INPUT"{14 SPACEs}";T$:IFT$
      =""THEN99ØØ       :REM*12
13484 IFT$<"AØ"ORT$>"Z9"THEN1347
      Ø                 :REM*22Ø
13486 R2=ASC(LEFT$(T$,1))-65:T=V
      AL(MID$(T$,2)):IFT<TCTHEN1
      347Ø              :REM*82
13487 IFR2<R1THEN1347Ø    :REM*91
13488 GOSUB137ØØ         :REM*226
1349Ø T$=CHR$(16)        :REM*168
135ØØ OPEN4,4            :REM*88
135Ø5 PRINT#4,CHR$(1Ø)   :REM*215
13525 FORR=R1TOR2         :REM*1Ø7
13535 IFTC>TTHEN137ØØ     :REM*49
1354Ø PRINT#4,T$;"Ø3";DA$(R,TC);
                        :REM*84
13545 IFTC+1>TTHEN136ØØ   :REM*19
1355Ø PRINT#4,T$;"14";DA$(R,TC+1
      );                :REM*226
13555 IFTC+2>TTHEN136ØØ   :REM*93
1356Ø PRINT#4,T$;"25";DA$(R,TC+2
      );                :REM*5Ø
13565 IFTC+3>TTHEN136ØØ  :REM*167
1357Ø PRINT#4,T$;"36";DA$(R,TC+3
      );                :REM*131
13575 IFTC+4>TTHEN136ØØ  :REM*244
13577 PRINT#4,T$;"47";DA$(R,TC+4
      );                :REM*21Ø
1358Ø IFTC+5>TTHEN136ØØ   :REM*57
13585 PRINT#4,T$;"58";DA$(R,TC+5
      );                :REM*32
1359Ø IFTC+6>TTHEN136ØØ  :REM*131
13595 PRINT#4,T$;"69";DA$(R,TC+6
      );                :REM*112
136ØØ PRINT#4,CHR$(13);:NEXT
                        :REM*33
1361Ø TC=TC+7:IFTC>TTHENPRINT#4:
      CLOSE4:GOTO99ØØ   :REM*73
1362Ø PRINTCHR$(147):PRINT:PRINT
                        :REM*2Ø7
1363Ø PRINT"{6 SPACEs}..... MOR
      E TO COME ....."  :REM*159
13635 PRINT              :REM*222
1364Ø PRINT"{6 SPACEs}PLEASE ALI
      GN PRINTER PAPER" :REM*2Ø7
1365Ø PRINT"{5 SPACEs}AND PRESS
      'SPACE' TO CONTINUE"
                        :REM*125
13655 GETG$:IFG$<>" "THEN13655
                        :REM*166
13656 GOSUB137ØØ         :REM*139
1366Ø GOTO135Ø5          :REM*193
137ØØ PRINTCHR$(147):PRINT:PRINT
                        :REM*31
1371Ø PRINT"{6 SPACEs}......{4 S
      PACEs}WORKING{3 SPACEs}...
      ..."              :REM*49
1372Ø RETURN              :REM*7
14ØØØ S=S+3              :REM*34
14Ø1Ø IFMID$(IN$,S+1,1)<"A"ORMID
      $(IN$,S+1,1)>"Z"THEN2ØØØØ
                        :REM*54
14Ø2Ø IFMID$(IN$,S+2,1)<"Ø"ORMID
      $(IN$,S+2,1)>"9"THEN2ØØØØ
                        :REM*176
14Ø3Ø IFMID$(IN$,S+3,1)<"-"ORMID
      $(IN$,S+3,1)>"9"THEN2ØØØØ
                        :REM*2Ø4
14Ø4Ø IFVAL(MID$(IN$,S+2,2))<ØOR
      VAL(MID$(IN$,S+2,2))>29THE
      N2ØØØØ            :REM*2Ø2
14Ø5Ø IFMID$(IN$,S+3,1)<>"-"ANDM
      ID$(IN$,S+4,1)<>"-"THEN2ØØ
      ØØ                :REM*216
14Ø6Ø IFMID$(IN$,S+4,1)="-"THENS
      1=5:GOTO14Ø7Ø      :REM*48
14Ø65 S1=4               :REM*177
14Ø7Ø IFMID$(IN$,S+S1,1)<"A"ORMI
      D$(IN$,S+S1,1)>"Z"THEN2ØØØ
      Ø                 :REM*4Ø
14Ø9Ø IFMID$(IN$,S+S1+1,1)<"Ø"OR
      MID$(IN$,S+S1+1,1)>"9"THEN
      2ØØØØ             :REM*15
141ØØ IFVAL(MID$(IN$,S+S1+1,2))<
      ØORVAL(MID$(IN$,S+S1+1,2))
      >29THEN2ØØØØ      :REM*153
141Ø1 IFMID$(IN$,S+1,1)>MID$(IN$
      ,S+S1,1)THEN2ØØØØ  :REM*64
141Ø2 IFMID$(IN$,S+1,1)=MID$(IN$
      ,S+S1,1)THEN1411Ø :REM*137
141Ø3 IFMID$(IN$,S+1,1)>MID$(IN$
      ,S+S1,1)THEN2ØØØØ  :REM*66
141Ø4 IFVAL(MID$(IN$,S+2,2))<>VA
      L(MID$(IN$,S+S1+1,2))THEN2
      ØØØØ              :REM*215
141Ø7 IFMID$(IN$,S+1,1)>=MID$(IN
      $,S+S1,1)THEN2ØØØØ :REM*14
141Ø8 IFMID$(IN$,S-2,3)="COP"THE
      NT$=MID$(IN$,S-3,17):RETUR
      N                 :REM*185
141Ø9 FC$(R,CD)=MID$(IN$,S-3,17)
      :RETURN           :REM*78
1411Ø IFVAL(MID$(IN$,S+2,2))>=VA
      L(MID$(IN$,S+S1+1,2))THEN2
      ØØØØ              :REM*221
14115 GOTO141Ø8          :REM*156
2ØØØØ PRINTCHR$(19);:PRINT
                        :REM*178
2ØØØ5 PRINTCHR$(18);" FORMAT ERR
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Listing 1 continued.

```
      OR-PRESS ANY KEY TO CONTIN
      UE"                    :REM*105
2001Ø GETG$:IFG$=""THEN2001Ø
                             :REM*226
2002Ø GOTO2Ø                 :REM*62
22000 GOSUB1255Ø:FORCD=ØTO29
                             :REM*83
2201Ø FORR=ØTO25             :REM*147
2202Ø IFFC$(R,CD)<>""THENGOSUB22
      Ø6Ø                    :REM*18Ø
2203Ø NEXTR:NEXTCD           :REM*23Ø
2204Ø GOTO99ØØ               :REM*4
2206Ø IFMID$(FC$(R,CD),2,3)="SUM
      "THEN23ØØØ            :REM*15Ø
2207Ø IFMID$(FC$(R,CD),2,3)="MIN
      "THEN2314Ø            :REM*238
2208Ø IFMID$(FC$(R,CD),2,3)="MAX
      "THEN2334Ø            :REM*26
2209Ø IFMID$(FC$(R,CD),2,3)="AVG
      "THEN2350Ø             :REM*Ø
2210Ø GOSUB28ØØØ             :REM*32
22999 RETURN                 :REM*106
23000 GOSUB26ØØØ             :REM*135
23060 DA=Ø:IFR1=R2THEN2310Ø
                             :REM*176
23065 FORX=R1TOR2             :REM*5
23070 DA=DA+DA(X,C1)         :REM*32
23080 NEXT:GOSUB27ØØØ        :REM*242
23090 RETURN                 :REM*198
2310Ø FORX=C1TOC2             :REM*56
2311Ø DA=DA+DA(R1,X)         :REM*82
2312Ø NEXT:GOSUB27ØØØ        :REM*26
2313Ø RETURN                 :REM*238
2314Ø GOSUB26ØØØ             :REM*2Ø
23200 IFR1=R2THEN23235       :REM*22
23204 DA=DA(R1,C1)           :REM*234
23205 FORX=R1TOR2            :REM*145
23207 IFDA(X,C1)=ØANDDA$(X,C1)<>
      "{8 SPACEs}Ø"THEN2322Ø
                             :REM*217
2321Ø IFDA>DA(X,C1)THENDA=DA(X,C
      1)                     :REM*188
2322Ø NEXT:GOSUB27ØØØ        :REM*126
2323Ø RETURN                  :REM*82
23235 DA=DA(R1,C1)             :REM*9
2324Ø FORX=C1TOC2            :REM*196
23245 IFDA(R1,X)=ØANDDA$(R1,X)<>
      "Ø"THEN2326Ø           :REM*189
2325Ø IFDA>DA(R1,X)THENDA=DA(R1,
      X)                     :REM*19Ø
2326Ø NEXT:GOSUB27ØØØ        :REM*166
2327Ø RETURN                 :REM*122
2334Ø GOSUB26ØØØ             :REM*221
23400 IFR1=R2THEN23435       :REM*239
23404 DA=DA(R1,C1)           :REM*179
23405 FORX=R1TOR2             :REM*9Ø
23407 IFDA(X,C1)=ØANDDA$(X,C1)<>
      "{8 SPACEs}Ø"THEN2342Ø
                             :REM*162
2341Ø IFDA<DA(X,C1)THENDA=DA(X,C
      1)                     :REM*197
2342Ø NEXT:GOSUB27ØØØ         :REM*71
2343Ø RETURN                  :REM*27
23435 DA=DA(R1,C1)           :REM*21Ø
2344Ø FORX=C1TOC2            :REM*141
23445 IFDA(X,C1)=ØANDDA$(X,C1)<>
      "Ø"THEN2346Ø           :REM*2Ø4
2345Ø IFDA<DA(R1,X)THENDA=DA(R1,
      X)                     :REM*199
2346Ø NEXT:GOSUB27ØØØ        :REM*111
2347Ø RETURN                  :REM*67
23500 GOSUB26ØØØ             :REM*125
23560 DA=Ø:TC=Ø:IFR1=R2THEN236ØØ
                             :REM*82
23565 FORX=R1TOR2            :REM*251
23568 IFDA(X,C1)=ØANDDA$(X,C1)<>
      "{8 SPACEs}Ø"THEN2358Ø
                             :REM*202
2357Ø DA=DA+DA(X,C1):TC=TC+1
                             :REM*14Ø
2358Ø NEXT:IFTC=ØTHENDA$(R,CD)="
      {8 SPACEs}Ø":RETURN
                             :REM*176
23585 DA=DA/TC:GOSUB27ØØØ
                             :REM*255
2359Ø RETURN                 :REM*188
23600 FORX=C1TOC2             :REM*46
23605 IFDA(R1,X)=ØANDDA$(R1,X)<>
      "Ø"THEN2362Ø           :REM*37
2361Ø DA=DA+DA(R1,X):TC=TC+1
                             :REM*19Ø
2362Ø NEXT:IFTC=ØTHENDA$(R,CD)="
      {8 SPACEs}Ø":RETURN
                             :REM*216
23628 DA=DA/TC:GOSUB27ØØØ:REM*42
2363Ø RETURN                 :REM*228
24000 PRINTCHR$(147)          :REM*61
2401Ø PRINT:PRINT"{16 SPACEs}LOA
      D":PRINT               :REM*183
2402Ø PRINT"{8 SPACEs}ENTER FILE
       NAME OR "             :REM*93
2403Ø PRINT"{6 SPACEs}PRESS 'RET
      URN' TO EXIT."         :REM*73
24035 PRINT                  :REM*166
2404Ø IN$="":INPUT"{14 SPACEs}";
      IN$                    :REM*255
2405Ø IFIN$=""THEN99ØØ       :REM*23
2406Ø PRINT:PRINT"{6 SPACEs}TAPE
       OR DISK{2 SPACEs}(T/D)"
                             :REM*247
2407Ø GETG$                  :REM*102
2408Ø IFG$="T"THEN242ØØ      :REM*5Ø
2409Ø IFG$="D"THENOPEN15,8,15:GO
      TO2411Ø                :REM*4Ø
2410Ø GOTO2407Ø              :REM*106
2411Ø OPEN2,8,2,"Ø:"+IN$+",S,R":
      GOSUB245ØØ             :REM*108
24115 INPUT#2,Z:INPUT#2,P:GOSUB2
      45ØØ                    :REM*7
2412Ø FORR=ØTO25:FORCD=ØTO29
                             :REM*1Ø
2413Ø INPUT#2,DA$(R,CD)      :REM*24Ø
2414Ø IFDA$(R,CD)="*"THENDA$(R,C
      D)=""                  :REM*7Ø
2415Ø INPUT#2,FC$(R,CD)      :REM*196
2416Ø IFFC$(R,CD)="*"THENFC$(R,C
      D)=""                  :REM*15Ø
24165 INPUT#2,DA(R,CD)       :REM*129
2417Ø NEXT:NEXT:GOSUB245ØØ:CLOSE
      2:CLOSE15              :REM*17Ø
2418Ø GOTO2428Ø               :REM*58
24200 OPEN1,1,Ø,+IN$          :REM*86
2421Ø INPUT#1,Z:INPUT#1,P:REM*54
2422Ø FORR=ØTO25:FORCD=ØTO29
                             :REM*11Ø
2423Ø INPUT#1,DA$(R,CD)      :REM*76
2424Ø IFDA$(R,CD)="*"THENDA$(R,C
      D)=""                  :REM*17Ø
2425Ø INPUT#1,FC$(R,CD)      :REM*32
2426Ø IFFC$(R,CD)="*"THENFC$(R,C
      D)=""                  :REM*25Ø
24265 INPUT#1,DA(R,CD)       :REM*221
2427Ø NEXT:NEXT:CLOSE1       :REM*56
2428Ø FORR=ØTO25:FORCD=ØTO29
                             :REM*17Ø
24285 IFLEN(DA$(R,CD))=ØTHEN2436
      Ø                      :REM*135
2429Ø IFLEN(DA$(R,CD))=9THEN2436
      Ø                      :REM*15Ø
24300 IFLEN(DA$(R,CD))>9THEN2435
      Ø                      :REM*254
24305 IFDA(R,CD)=ØANDDA$(R,CD)<>
      "Ø"THEN2436Ø           :REM*219
2431Ø FORX=1TO9-LEN(DA$(R,CD))
                             :REM*15Ø
2432Ø DA$(R,CD)=" "+DA$(R,CD)
                             :REM*215
2433Ø NEXT                   :REM*115
2434Ø GOTO2436Ø              :REM*123
2435Ø DA$(R,CD)=LEFT$(DA$(R,CD),
      9)                     :REM*157
2436Ø NEXT:NEXT              :REM*139
2437Ø GOTO99ØØ               :REM*39
24500 INPUT#15,E,E$:IFE<>ØTHEN24
      52Ø                    :REM*193
2451Ø RETURN                  :REM*87
2452Ø PRINTCHR$(147)          :REM*71
24525 PRINT"{6 SPACEs}";:REM*132
24530 PRINTCHR$(18);:PRINT"{5 SP
      ACEs}DISK ERROR{6 SPACEs}"
                             :REM*191
2454Ø PRINT"{6 SPACEs}";:REM*147
2455Ø PRINTE$                :REM*23
2456Ø PRINT:PRINT:PRINT      :REM*207
2457Ø PRINT"{2 SPACEs}PRESS ANY
      KEY TO CONTINUE{2 SPACEs}"
                             :REM*137
2458Ø GETG$:IFG$=""THEN2458Ø
                             :REM*88
2459Ø CLOSE2:CLOSE15:GOTO99ØØ
                             :REM*38
25000 PRINTCHR$(147)          :REM*41
2501Ø PRINT:PRINT"{16 SPACEs}SAV
      E":PRINT               :REM*113
2502Ø PRINT"{8 SPACEs}ENTER FILE
       NAME OR "             :REM*73
2503Ø PRINT"{6 SPACEs}PRESS 'RET
      URN' TO EXIT."         :REM*53
25035 PRINT                  :REM*146
2504Ø IN$="":INPUT"{14 SPACEs}";
      IN$                    :REM*235
2505Ø IFIN$=""THEN99ØØ        :REM*3
2506Ø PRINT:PRINT"{6 SPACEs}TAPE
       OR DISK{2 SPACEs}(T/D)"
                             :REM*227
2507Ø GETG$                   :REM*81
2508Ø IFG$="T"THEN252ØØ      :REM*37
2509Ø IFG$="D"THENOPEN15,8,15:GO
      TO2511Ø                :REM*52
2510Ø GOTO2507Ø              :REM*102
2511Ø OPEN2,8,2,"Ø:"+IN$+",S,W":
      GOSUB245ØØ             :REM*154
25115 PRINT#2,Z:PRINT#2,P:REM*37
2512Ø FORR=ØTO25:FORCD=ØTO29
                             :REM*246
2513Ø IFDA$(R,CD)=""THENPRINT#2,
      "*":GOTO2515Ø          :REM*134
2514Ø PRINT#2,DA$(R,CD)      :REM*54
2515Ø IFFC$(R,CD)=""THENPRINT#2,
      "*":GOTO25165          :REM*34
2516Ø PRINT#2,FC$(R,CD)      :REM*1Ø
25165 PRINT#2,DA(R,CD)       :REM*189
2517Ø NEXT:NEXT:GOSUB245ØØ:CLOSE
      2:CLOSE15              :REM*15Ø
2518Ø GOTO99ØØ               :REM*84
25200 OPEN1,1,1,+IN$         :REM*194
2521Ø PRINT#1,Z:PRINT#1,P
                             :REM*124
2522Ø FORR=ØTO25:FORCD=ØTO29
                             :REM*9Ø
2523Ø IFDA$(R,CD)=""THENPRINT#1,
      "*":GOTO2525Ø          :REM*236
2524Ø PRINT#1,DA$(R,CD)      :REM*146
2525Ø IFFC$(R,CD)=""THENPRINT#1,
      "*":GOTO25265          :REM*136
2526Ø PRINT#1,FC$(R,CD)      :REM*102
25265 PRINT#1,DA(R,CD)        :REM*25
2527Ø NEXT:NEXT:CLOSE1       :REM*36
2528Ø GOTO99ØØ               :REM*184
26000 T$=FC$(R,CD)            :REM*63
2601Ø R1=ASC(MID$(T$,5,1))-65
                             :REM*199
2602Ø C1=VAL(MID$(T$,6,2))
                             :REM*235
2603Ø IFMID$(T$,7,1)="-"THENR2=A
      SC(MID$(T$,8,1))-65:GOTO26
      Ø5Ø                    :REM*189
2604Ø R2=ASC(MID$(T$,9,1))-65:C2
      =VAL(MID$(T$,1Ø,2)):GOTO26
      Ø6Ø                    :REM*241
2605Ø C2=VAL(MID$(T$,9,2))
                             :REM*65
2606Ø RETURN                 :REM*107
27000 DA(R,CD)=DA:DA=INT(DA*P+.5
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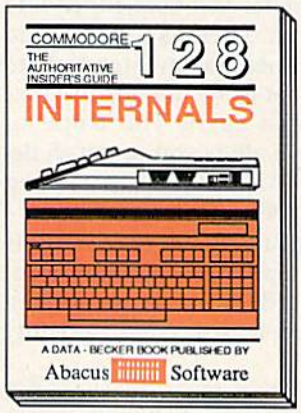
    )/P                    :REM*171
27005 IFLEN(STR$(DA))<9THENDA$(R
    ,CD)=STR$(DA):GOTO27070
                           :REM*132
27010 IFLEN(STR$(DA))=9THENDA$(R
    ,CD)=STR$(DA):RETURN
                           :REM*179
27020 IFDA>0THENT$=RIGHT$(STR$(D
    A),LEN(STR$(DA))-1):GOTO27
    050                    :REM*65
27030 GOTO27060            :REM*215
27050 IFLEN(T$)=9THENDA$(R,CD)=T
    $:RETURN               :REM*51
27055 IFLEN(T$)<9THENDA$(R,CD)=T
    $:GOTO27070            :REM*114
27060 DA$(R,CD)="*********":RETU
    RN                     :REM*205
27070 FORX=1TO9-LEN(DA$(R,CD))
                           :REM*105
27080 DA$(R,CD)=" "+DA$(R,CD)
                           :REM*169
27090 NEXT                 :REM*69
27100 RETURN               :REM*127
28000 R1=ASC(MID$(FC$(R,CD),2,1)
    )-65                   :REM*253
28010 C1=VAL(MID$(FC$(R,CD),3,2)
    )                      :REM*231
28020 T$=MID$(FC$(R,CD),4,1)
                           :REM*247
28030 IFT$="+"ORT$="-"ORT$="*"OR
    T$="{UP ARROW}"ORT$="/"THE
    NS=5:GOTO28050         :REM*23
28040 S=6                  :REM*61
28045 T$=MID$(FC$(R,CD),5,1)
                           :REM*18
28050 TC=0                 :REM*157
28060 IFMID$(FC$(R,CD),S,1)<"A"T
    HENTC=1:GOTO28200      :REM*227
28070 R2=ASC(MID$(FC$(R,CD),S,1)
    )-65                   :REM*83
28080 C2=VAL(MID$(FC$(R,CD),S+1,
    2))                    :REM*193
28100 IFT$="+"THENDA=DA(R1,C1)+D
    A(R2,C2):GOSUB27000:RETURN
                           :REM*51
28110 IFT$="-"THENDA=DA(R1,C1)-D
    A(R2,C2):GOSUB27000:RETURN
                           :REM*125
28120 IFT$="*"THENDA=DA(R1,C1)*D
    A(R2,C2):GOSUB27000:RETURN
                           :REM*73
28130 IFT$="{UP ARROW}"THEN28380
                           :REM*179
28140 IFDA(R2,C2)=0THENDA$(R,CD)
    ="DIV. BY 0":DA(R,CD)=0:RE
    TURN                   :REM*29
28150 IFT$="/"THENDA=DA(R1,C1)/D
    A(R2,C2):GOSUB27000:RETURN
                           :REM*41
28160 RETURN               :REM*168
28200 DA=VAL(MID$(FC$(R,CD),S,19
    ))                     :REM*56
28210 IFT$="+"THENDA=DA(R1,C1)+D
    A:GOSUB27000:RETURN
                           :REM*196
28220 IFT$="-"THENDA=DA(R1,C1)-D
    A:GOSUB27000:RETURN:REM*14
28230 IFT$="*"THENDA=DA(R1,C1)*D
    A:GOSUB27000:RETURN
                           :REM*218
28240 IFT$<>"/"THEN28270   :REM*24
28250 IFDA=0THENDA$(R,CD)="DIV.
    BY 0":DA(R,CD)=0:RETURN
                           :REM*250
28260 IFT$="/"THENDA=DA(R1,C1)/D
    A:GOSUB27000:RETURN
                           :REM*186
28270 IFT$<>"{UP ARROW}"THENRETU
    RN                     :REM*150
28280 IFDA(R1,C1)>5ANDDA>4@THEND
    A$(R,CD)="OVERFLOW":DA(R,C
    D)=0:RETURN            :REM*188
28290 IFDA(R1,C1)>1@ANDDA>2@THEN
    DA$(R,CD)="OVERFLOW":DA(R,
    CD)=0:RETURN           :REM*2
28292 IFDA(R1,C1)>2@ANDDA>15THEN
    DA$(R,CD)="OVERFLOW":DA(R,
    CD)=0:RETURN           :REM*108
28294 IFDA(R1,C1)>1@@@ANDDA>5THE
    NDA$(R,CD)="OVERFLOW":DA(R
    ,CD)=0:RETURN          :REM*0
28296 IFDA(R1,C1)>1@@@@@@ANDDA>2
    THENDA$(R,CD)="OVERFLOW":D
    A(R,CD)=0:RETURN       :REM*120
28300 DA=ABS(DA(R1,C1)){UP ARROW
    }DA:GOSUB27000:RETURN
                           :REM*224
28380 IFDA(R1,C1)>5ANDDA(R2,C2)>
    4@THENDA$(R,CD)="OVERFLOW"
    :DA(R,CD)=0:RETURN     :REM*96
28390 IFDA(R1,C1)>1@ANDDA(R2,C2)
    >2@THENDA$(R,CD)="OVERFLOW
    ":DA(R,CD)=0:RETURN
                           :REM*236
28392 IFDA(R1,C1)>2@ANDDA(R2,C2)
    >15THENDA$(R,CD)="OVERFLOW
    ":DA(R,CD)=0:RETURN:REM*50
28394 IFDA(R1,C1)>1@@@ANDDA(R2,C
    2)>5THENDA$(R,CD)="OVERFLO
    W":DA(R,CD)=0:RETURN
                           :REM*208
28396 IFDA(R1,C1)>1@@@@@ANDDA(R2
    ,C2)>2THENDA$(R,CD)="OVERF
    LOW":DA(R,CD)=0        :REM*28
28397 RETURN               :REM*149
28400 DA=ABS(DA(R1,C1)){UP ARROW
    }DA(R2,C2):GOSUB27000:RETU
    RN                     :REM*56
```

■

One good book... deserves another... and another...



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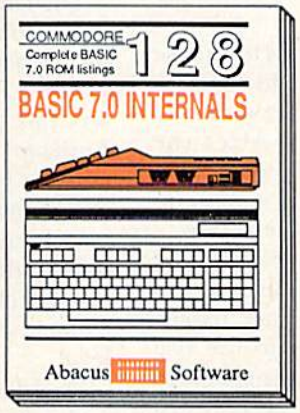

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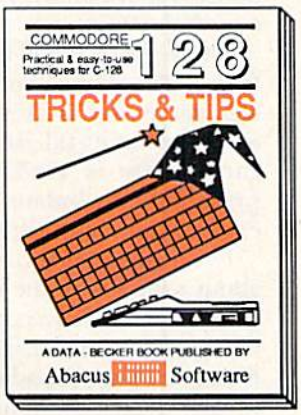

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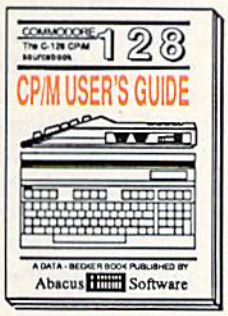

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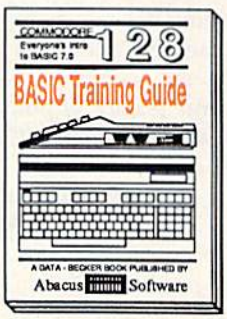

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Circle 185 on Reader Service card.

From p. 27.

player out of the game before he becomes exhausted.

At each dead ball situation, you can bring players in off the bench or you can call time out to alter strategies. On offense, you can choose to play normal, aggressive or safe.

On defense, you can choose a man-to-man (tight or loose), zone (sagging, trapping, matchup) or full-court press. My only defensive complaint is that, when using man-to-man, you can't pick who is guarding whom, and double-team options aren't available.

There's a computer opponent to play against, but that coach sometimes makes silly substitutions or lets his players become exhausted. It certainly is more enjoyable to face a human foe.

There are over 500 teams to choose from—355 teams come with the college game and the rest are available on supplemental disks. After the game, there is available a detailed printout that tabulates the total of every stat you might find interesting.

I've found very little to quibble about with any of the features of this game. It's the only computer basketball game on the market to use real teams and players and to provide such a high degree of statistical accuracy. Any avid computer sports gamer should consider it a "must buy."

My only major complaint is the way the instructions are sent to the computer. In the two-player mode, it's necessary for both players to sit huddled around the computer keyboard because the game does not accept joystick entries. It's a small price to pay, however, for such an accurate and enjoyable program. *(Lance Haffner Games, PO Box 100594, Nashville, TN 37210. C-64/$29.99 disk.)*

Rick Teverbaugh
Anderson, IN

Battle of Antietam

This Civil War Simulation Will Have Your Forces Dueling to the Death

B

It's easy to understand why certain war simulations reach the marketplace. Many are examples of great tactical planning and strategy; others are turning points in a particular war.

It is puzzling, then, that SSI would select the Battle of Antietam as a game choice. (For the uninitiated, the battle took place on September 17, 1862, along Antietam Creek in Sharpsburg, Maryland.)

The 11-hour battle is called the bloodiest day of the Civil War with good reason: Over 22,000 American soldiers lost their lives. But, despite all the bloodshed, it was a battle neither side won.

For those with an eye toward history, this simulation can be enacted just the way it was over 100 years ago: At its advanced stage, the game will take about the 11 hours that the real battle raged.

The computer will take either side in the conflict. There is a basic game for the beginner and an intermediate level test. That is the one feature that sets this game apart: The Battle of Antietam will allow you to get as detailed as you'd like without sacrificing any of the quality of the game.

Like almost all SSI entries, it is stuffed with many options. After choosing which side will be player-controlled, you can select the difficulty level.

The documentation is well-written and contains an extensive historical overview of the battle. There are complete order-of-battle and organizational charts, as well as tables for operational costs, weapons and melee combat results. The tables are reprinted on the flip side of the plastic map card.

One minor complaint is that the list of commands should have also been printed on the back of the card. In my first few times through the battle, I found that I went back to the rules booklet much more often than I consulted the map card.

To determine a winner, the computer keeps track of each man, brigade, division or corps leader lost in the battle and assigns it a point value. There are also points to be won for securing certain squares on the board.

At the end of the 11 turns, the computer will award a minor or major victory to either side or declare the entire mess a draw.

Overall, Antietam is a forgettable part of our Civil War heritage. But, if improving upon history is your gaming goal, you shouldn't have any trouble finding satisfaction here. *(Strategic Simulations, Inc., 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94943. C-64/$49.95 disk.)*

Rick Teverbaugh
Anderson, IN

dfile128

B

This Simple Database Can Effectively Meet Many Computerists' Needs

Mike Konshak, familiar to many readers as the author of Datafile for the C-64 (*RUN*, November and December, 1984), has applied his skills as a programmer to the C-128. The result is dfile128, a simple yet effective and highly efficient database management system.

Konshak's 32-page instruction manual states that dfile128 supports single or dual disk drives (1541/1571), and all Commodore or ASCII printers will work with this program.

Using string arrays, dfile128 turns 64K of memory in your C-128 into something similar to a RAM disk. The contents of a database are simply loaded into your computer from a sequential disk file.

Lengthy disk searches are a thing of the past with dfile128. This approach to data manipulation allows instantaneous access to your information. Unlike most databases, there is no difference in speed when the search is not restricted to the key field.

With dfile128, designing a blank record form to hold the data you wish to file is quite effortless. Records can contain an unlimited number of fields, with each field containing up to 160 characters. However, the manual does advise that you limit yourself to 15 fields.

When you've created a suitable format for your information, entering data is a breeze. If you are familiar with disk-intensive database programs, you'll really enjoy the ease with which you can add, search, modify and delete records.

By allowing you to replicate data from the previous record, dfile128 eliminates the need to constantly re-

type the same information, such as the date. This handy feature could be made even better if the duplicated data appeared on the screen, but it doesn't: You have to take it on faith that the proper entry has been made.

Another minor drawback is that the software sorts from the left-most character. For example, 1, 4 and 300 will sort into 1, 300 and 4 if leading zeroes are not entered (001, 004, 300).

The dfile128 program demonstrates a fair amount of agility in the area of printing reports. In addition to dumping selected records to your screen or printer if they meet specified search criteria, dfile128 will print mailing labels up to four across on continuous feed forms.

The real strength of dfile128 does not become apparent until you learn to create calculated reports. Almost one-third of the documentation is devoted to helping you harness the power of this function, which allows the automatic preparation of spreadsheet-like reports.

This versatile program contains many other features too numerous to explore in detail here. For example, you can write your own formulas, call for constants, perform a host of trigonometric and algebraic functions and generate reports that display the results of functions such as reciprocals, logarithms and measurement conversions.

If you are contemplating very large databases, dfile128 can create them in the form of several small ones. A companion disk of File Utility Programs ($14.95) provides the ability to combine similar datafiles into a single file and then print directly from the larger file.

While dfile128 is easy to operate, I did find a few inconveniences. My C-128's function keys were not disabled and accidentally pressing one resulted in a Basic operating command such as Dload being sent to the screen. Another minor flaw is the lack of a provision to adjust the page length to anything other than 66 lines.

All in all, dfile128 is a useful tool. Any 128 owner who wants to quickly store and retrieve data without a lot of fuss should give dfile128 a close look. *(Michaelsoft, 4821 Harvest Court, Colorado Springs, CO 80917. C-128/ $24.95 disk.)*

John Premack
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From p. 76.

Listing 1.

Commodore 64 version of Morse Code Tutor.

```
100 DATA 112211,0,12,2111,2121,2
    11,1,1121,221,1111,11,1222,2
    12,1211,22,21,222      :REM*22
110 DATA 1221,2212,121,111,2,112
    ,1112,122,2112,2122,2211,212
    212                    :REM*42
120 DATA 12121,111212,1111111,22
    1122,21112,121212,21121,2222
    2                      :REM*118
130 DATA 12222,11222,11122,11112
    ,11111,21111,22111,22211,222
    21,222111,212121       :REM*172
140 DATA 162,6,32,255,233,232,22
    4,25,208,248,96        :REM*150
150 AL$="ABCDEFGHIJKLMNOPQRSTUVW
    XYZ1234567890?,./:;-(":D$(1)
    ="{COMD F}":D$(2)="{COMD I}{
    COMD F}"               :REM*24
160 DIMC(91,7),C$(91):CR$="{HOME
    }{8 CRSR DNs}"         :REM*108
170 B=63:E=90:GOSUB180:B=40:E=59
    :GOSUB180:GOTO200      :REM*178
180 FORA=BTOE:READL$:FORC=1TOLEN
    (L$):C(A,C)=VAL(MID$(L$,C,1)
    )                      :REM*152
190 C$(A)=C$(A)+D$(C(A,C)):NEXT:
    NEXT:RETURN            :REM*144
200 FORAD=828TO838:READN:POKEAD,
    N:NEXT                 :REM*90
210 READLB$(Q):IFLB$(Q)<>"X"THEN
    Q=Q+1:GOTO210          :REM*172
220 POKE54277,9:POKE54278,144:PO
    KE54274,0:POKE54275,8:POKE54
    296,15                 :REM*20
230 POKE53280,6:POKE53281,0:PRIN
    T"{SHFT CLR}{COMD 4}{2 CRSR
    DNs}{19 SPACEs}{CTRL 9}{COMD
     H}{CTRL 0}{COMD O}{COMD I}"
                           :REM*208
240 PRINT"{13 SPACEs}{SHFT M}{2
    COMD Is} {CTRL 9}{2 COMD Vs}
     {SHFT W}{2 SPACEs}{COMD T}
    {CTRL 0}{COMD O}{CTRL 9}{COM
    D T}{CTRL 0}{SHFT *}":REM*18
250 PRINT"{10 SPACEs}{COMD *}{CT
    RL 9}{19 SPACEs}"      :REM*108
260 PRINT"{COMD 7}{5 SPACEs}{COM
    D I}{3 COMD Fs}{COMD I}{3 CO
    MD Fs}{COMD I}{3 COMD Fs}{CO
    MD I}{3 COMD Fs}{COMD I}{3 C
    OMD Fs}{COMD I}{3 COMD Fs}{C
    OMD I}{3 COMD Fs}{COMD I}{CO
    MD F}{COMD 6}{CRSR DN}":M$="
    INTERNATIONAL MORSE CODE"
                           :REM*179
270 F$(0)="{HOME}{3 CRSR DNs}{20
     CRSR RTs}{COMD 4}{CTRL 9}{S
    HFT W}{CTRL 0}":F$(1)="{HOME
    }{3 CRSR DNs}{20 CRSR RTs}{C
    TRL 2}{SHFT Q}"        :REM*27
280 S(1)=1:S(2)=3:TM=40:TT$=M$:I
    FFLTHENPRINTTAB(8)M$:GOTO400
                           :REM*101
290 FORL=1TO24:GOSUB300:PRINTCR$
    ;"{CRSR UP}{COMD 6}";TAB(7+L
    );ML$:NEXT:FL=1:GOTO400
                           :REM*17
300 ML$=MID$(M$,L,1):S(0)=2:S=0:
    POKE54272,74:POKE54273,42
                           :REM*137
310 S=S+1:F=1:T=C(ASC(ML$),S):IF
    TTHEN340               :REM*19
320 F=0:IFML$=" "THENS(0)=4
                           :REM*21
330 GOTO350                :REM*101
340 PRINTF$(F):POKE54276,65
                           :REM*137
350 FORDUR=1TOTM*S(T):NEXT:POKE5
    4276,64:PRINTF$(0)     :REM*207
360 FORRS=1TOTM:NEXT:IFTTHEN310
                           :REM*107
370 RETURN                 :REM*173
400 PRINTCR$;TAB(17);"{3 CRSR DN
    s}{CTRL 8}{CTRL 9} MENU ":PR
    INTTAB(14)"{2 CRSR DNs}1. CO
    DE CHART"              :REM*239
410 PRINTTAB(14)"{CRSR DN}2. REC
    EIVING":PRINTTAB(14)"{CRSR D
    N}3. SENDING"          :REM*131
420 GETA$:IFA$<"1"ORA$>"3"THEN42
    0                      :REM*241
430 ONVAL(A$)GOTO440,650,900
                           :REM*125
440 T$="{SHFT CLR}{CRSR DN}{COMD
     6}{8 SPACEs}"+M$+"{2 CRSR D
    Ns}":PRINTT$"{CRSR DN}":M$=A
    L$:FORL=65TO77:N=0     :REM*69
450 IFL<75THENN=ASC(MID$(M$,L-38
    ,1))                   :REM*225
460 PRINT" ";CHR$(L);" ";C$(L);T
    AB(14);CHR$(L+13);" ";C$(L+1
    3);                    :REM*101
470 PRINTTAB(27);CHR$(N);" ";C$(
    N):NEXT                :REM*105
480 POKE214,22:PRINT:PRINT"{2 SP
    ACEs}{CTRL 4}<<<{2 SPACEs}1.
    NEXT{3 SPACEs}2.REVIEW{3 SPA
    CEs}3.MENU{2 SPACEs}>>>"
                           :REM*67
490 GETA$:IFA$<"1"ORA$>"3"THEN49
    0                      :REM*249
500 ONVAL(A$)GOTO550,510,230
                           :REM*165
510 F$(0)="{HOME}{3 CRSR DNs}{21
     SPACEs}":TM=75:B=0:J=1:K=13
    :GOSUB530:B=13:K=26    :REM*115
520 GOSUB530:B=26:K=36:GOSUB530:
    GOTO490                :REM*172
530 FORL=JTOK:C=4:GOSUB540:GOSUB
    300:C=13:GOSUB540:B=B+40:NEX
    T:J=J+13:RETURN        :REM*146
540 FORP=BTOB+11:POKE55497+P,C:N
    EXT:RETURN             :REM*182
550 PRINTT$:FORL=37TO40:A1=ASC(M
    ID$(AL$,L,1)):A2=ASC(MID$(AL
    $,L+4,1))              :REM*196
560 PRINTTAB(5);CHR$(A1);" ";C$(
    A1);TAB(22);CHR$(A2);" ";C$(
    A2):PRINT:NEXT         :REM*246
570 PRINTTAB(5)"WAIT (L){11 SPAC
    Es}"+C$(76)            :REM*32
580 PRINTTAB(5)"{CRSR DN}INVITE
    TO XMIT (K) "+C$(75)   :REM*58
590 PRINTTAB(5)"{CRSR DN}END OF
    MESSAGE{5 SPACEs}"+C$(41)
                           :REM*146
600 PRINTTAB(5)"{CRSR DN}END OF
    WORK{8 SPACEs}"+C$(42)
                           :REM*110
610 PRINTTAB(5)"{CRSR DN}ERROR{1
    4 SPACEs}"+C$(43)      :REM*194
620 PRINT"{2 CRSR DNs}{4 SPACEs}
    {CTRL 4}<<<{2 SPACEs}PRESS A
    NY KEY FOR MENU{2 SPACEs}>>>
    "                      :REM*206
630 GETA$:IFA$=""THEN630 :REM*92
640 GOTO230                :REM*116
650 SYS828:PRINTCR$;"{CRSR UP}{C
    OMD 6}";TAB(8);TT$     :REM*128
660 PRINTTAB(14);"{3 CRSR DNs}{C
    TRL 8}{CTRL 9} RECEIVE MENU
    "                      :REM*78
670 PRINTTAB(12)"{2 CRSR DNs}1.
    RNDM CHARACTERS":PRINTTAB(12
    )"{CRSR DN}2. LIBRARY MESSAG
    E"                     :REM*118
680 PRINTTAB(12)"{CRSR DN}3. INP
    UT MESSAGE":PRINTTAB(12)"{CR
    SR DN}4. MAIN MENU" :REM*162
690 GETA$:IFA$<"1"ORA$>"4"THEN69
    0                      :REM*6
700 ONVAL(A$)GOTO710,800,810,230
                           :REM*116
710 M$=AL$:TM=75           :REM*98
720 SYS828:POKE198,0:L=INT(RND(.
    )*43+1):GOSUB300:PRINTCR$;TA
    B(20);"{CTRL 8}{COMD +}"
                           :REM*186
730 GETA$:IFA$=""THEN730:REM*224
740 PRINTCR$;TAB(20);A$    :REM*88
750 C$=ML$+"{2 SPACEs}"+C$(ASC(M
    L$)):PRINTTAB(20-LEN(C$)/2);
    "{COMD 6}{2 CRSR DNs}";C$
                           :REM*216
760 POKE214,21:PRINT:PRINTTAB(7)
    ;"{CTRL 4}<<<{2 SPACEs}CONTI
    NUE OR MENU{2 SPACEs}>>>"
                           :REM*134
770 GETA$:IFA$=""THEN770 :REM*11
780 IFA$="M"THEN650        :REM*5
790 GOTO720                :REM*35
800 L=INT(RND(.)*Q):M$=LB$(L):GO
    TO820                  :REM*121
810 SYS828:PRINTCR$:INPUT" {COMD
     6}MESSAGE";M$         :REM*47
820 SYS828:PRINTCR$:INPUT" {COMD
     6}WORDS PER MINUTE";T:TM=700
    0/T                    :REM*57
830 PRINTTAB(5)"{5 CRSR DNs}{CTR
    L 8}<<< PRESS ANY KEY TO BEG
    IN >>>"                :REM*193
840 GETA$:IFA$=""THEN840:REM*179
850 SYS828:FORL=1TOLEN(M$):GOSUB
    300                    :REM*199
860 PRINTCR$;TAB(L+1);:IFASC(ML$
    )>32THENPRINT"{CRSR LF}{CTRL
     8}{SHFT Z}"           :REM*253
870 NEXT:SYS828:PRINTCR$;M$:POKE
    214,20:PRINT           :REM*149
880 PRINT"{4 SPACEs}{CTRL 4}<<<{
    2 SPACEs}PRESS ANY KEY FOR M
    ENU{2 SPACEs}>>>"      :REM*219
890 GETA$:IFA$=""THEN890 :REM*37
895 GOTO650                :REM*180
900 SYS828:PRINTCR$;TAB(14);"BEG
    IN SENDING":T=0        :REM*61
910 POKE214,21:PRINT:PRINTTAB(7)
    ;"{CTRL 4}<<< PRESS 'M' FOR
    MENU >>>":RW$="{2 CRSR DNs}"
    :R=10                  :REM*211
920 L=18:M$="":GETA$:IFA$="M"THE
    N230                   :REM*187
930 IFA$=""THEN920         :REM*115
940 PRINTCR$;TAB(14);"{14 SPACEs
    }":IFTI-D>300THENT=T+1
                           :REM*251
950 D=TI:PRINTF$(1):POKE54276,65
                           :REM*57
960 IFPEEK(197)<>64THEN960
                           :REM*117
970 POKE54276,64:PRINTF$(0):K=2:
    IFTI-D<8THENK=1        :REM*43
980 PRINTCR$;TAB(L);"{CTRL 8}";D
    $(K):L=L+K:M$=M$+D$(K):D=TI
                           :REM*229
990 GETA$:IFA$<>""THEN950:REM*15
1000 IFTI-D<15THEN990      :REM*79
1010 FORC=44TO90:IFC$(C)<>M$THEN
     NEXT:C=42             :REM*43
1020 POKE198,0:PRINTCR$;RW$;TAB(
     T);CHR$(C):T=T+1:D=TI:IFT<3
     7THEN920              :REM*177
1030 T=1:RW$=RW$+"{CRSR DN}":R=R
     +1:IFR<20THEN920      :REM*64
1040 GOTO900               :REM*14
5000 DATA NO ONE KNOWS THEIR LIM
     ITATIONS UNTIL THEY TRY
                           :REM*101
5010 DATA "EVERYONE DESIRES TO L
     IVE LONG, BUT NO ONE DESIRE
     S TO BE OLD."         :REM*159
```

```
5Ø2Ø DATA LIKE OUR SHADOWS, OUR
     WISHES LENGTHEN AS OUR SUN
     SETS                    :REM*51
5Ø3Ø DATA IT IS BEST NOT TO SWAP
      HORSES WHEN CROSSING A STR
     EAM                     :REM*125
5Ø4Ø DATA "ALL THINGS THAT ARE,
     ARE WITH MORE SPIRIT CHASED
      THAN ENJOYED."         :REM*33
5Ø5Ø DATA "EXPERIENCE IS THE BES
     T TEACHER, EXCEPT THAT THE
     TUITION IS COSTLY."     :REM*83
5Ø6Ø DATA X                  :REM*167
```

Listing 2.

Commodore 128 version of Morse Code Tutor.

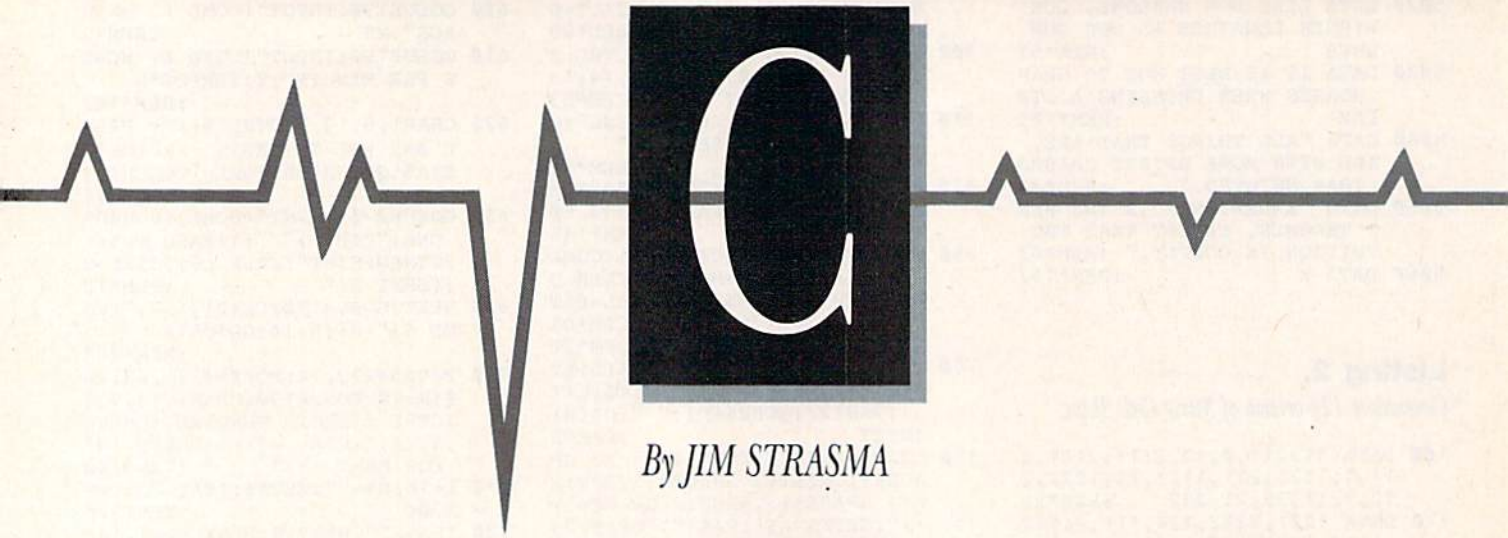
```
1ØØ DATA 112211,Ø,12,2111,2121,2
    11,1,1121,221,1111,11,1222,2
    12,1211,22,21,222     :REM*22
11Ø DATA 1221,2212,121,111,2,112
    ,1112,122,2112,2122,2211,212
    212                   :REM*42
12Ø DATA 12121,111212,1111111,22
    1122,21112,121212,21121,2222
    2                     :REM*118
13Ø DATA 12222,11222,11122,11112
    ,11111,21111,22111,22211,222
    21,222111,212121      :REM*172
14Ø FAST:AL$="ABCDEFGHIJKLMNOPQR
    STUVWXYZ123456789Ø?,./:;-(":
    D$(1)="{COMD F}":D$(2)="{COM
    D I}{COMD F}":DIMC(91,7),C$(
    91)                   :REM*166
15Ø B=63:E=9Ø:GOSUB16Ø:B=4Ø:E=59
    :GOSUB16Ø:GOTO17Ø     :REM*246
16Ø FORA=BTOE:READL$:FORC=1TOLEN
    (L$):C(A,C)=VAL(MID$(L$,C,1)
    ):C$(A)=C$(A)+D$(C(A,C)):NEX
    T:NEXT:RETURN         :REM*162
17Ø DO:READLB$(Q):Q=Q+1:LOOPUNTI
    LLB$(Q-1)="X":PLAY"V1O5T7U15
    XØ":GOTO2ØØ           :REM*242
19Ø CHARØ,Ø,6:PRINTCHR$(27);"@{C
    RSR DN}":RETURN       :REM*228
2ØØ COLOR4,7:COLORØ,1:SCNCLR:PRI
    NT"{COMD 4}{2 CRSR DNs}{19 S
    PACEs}{CTRL 9}{COMD H}{CTRL
    Ø}{COMD O}{COMD I}"   :REM*38
21Ø PRINT"{13 SPACEs}{SHFT M}{2
    COMD Is} {CTRL 9}{2 COMD Vs}
     {SHFT W}{2 SPACEs}{COMD T}
    {CTRL Ø}{COMD O}{CTRL 9}{COM
    D T}{CTRL Ø}{SHFT *}"
                          :REM*244
22Ø PRINT"{1Ø SPACEs}{COMD *}{CT
    RL 9}{19 SPACEs}":F$(Ø)="{CO
    MD 4}{CTRL 9}{SHFT W}{CTRL Ø
    }":F$(1)="{CTRL 2}{SHFT Q}"
                          :REM*214
23Ø S$(1)="ID.QR":S$(2)="HD.QR":
    TEMPO7Ø:M$="INTERNATIONAL MO
    RSE CODE"             :REM*2Ø6
24Ø PRINT"{COMD 7}{5 SPACEs}{COM
    D I}{3 COMD Fs}{COMD I}{3 CO
    MD Fs}{COMD I}{3 COMD Fs}{CO
    MD I}{3 COMD Fs}{COMD I}{3 C
    OMD Fs}{COMD I}{3 COMD Fs}{C
    OMD I}{3 COMD Fs}{COMD I}{CO
    MD F}{COMD 6}":IFFLTHENCHAR1
    ,8,7,M$:GOTO3ØØ       :REM*232
25Ø SLOW:FORL=1TO24:GOSUB27Ø:CHA
    R1,7+L,7,"{COMD 6}"+ML$:NEXT
    :FL=1:GOTO3ØØ         :REM*92
27Ø ML$=MID$(M$,L,1):S$(Ø)="HRR"
    :S=Ø:DO:S=S+1:F=1:T=C(ASC(ML
    $),S):IFT=ØTHENF=Ø:IFML$=" "
    THENS$(Ø)="WRR"       :REM*177
28Ø CHAR1,2Ø,3,F$(F):PLAYS$(T):C
    HAR1,2Ø,3,F$(Ø):LOOPUNTILT=Ø
    :RETURN               :REM*29
3ØØ CHAR1,17,12,"{CTRL 8}{CTRL 9
    } MENU {CTRL Ø}":CHAR1,14,15
    ,"1. CODE CHART"      :REM*53
31Ø CHAR1,14,17,"2. RECEIVING":C
    HAR1,14,19,"3. SENDING"
                          :REM*23
32Ø GETKEYA$:IFA$<"1"ORA$>"3"THE
    N32Ø:ELSEONVAL(A$)GOTO35Ø,5Ø
    Ø,7ØØ                 :REM*145
35Ø T$="{SHFT CLR}{CRSR DN}{COMD
     6}{7 SPACEs}"+M$+"{3 CRSR D
    Ns}":PRINTT$:M$=AL$:FORL=65T
    O77:N=Ø:IFL<75THENN=ASC(MID$
    (M$,L-38,1))          :REM*21
36Ø PRINT" ";CHR$(L);" ";C$(L);T
    AB(14);CHR$(L+13);" ";C$(L+1
    3);TAB(27);CHR$(N);" ";C$(N)
    :NEXT                 :REM*5
37Ø CHAR1,2,23,"{CTRL 4}<<<{2 SP
    ACEs}1.NEXT{3 SPACEs}2.REVIE
    W{3 SPACEs}3.MENU{2 SPACEs}>
    >>":GETKEYA$:IFA$<"1"ORA$>"3
    "THEN37Ø:ELSEONVAL(A$)GOTO4Ø
    Ø,38Ø,2ØØ             :REM*117
38Ø F$(Ø)=" ":TEMPO4Ø:B=Ø:J=1:K=
    13:GOSUB39Ø:B=13:K=26:GOSUB3
    9Ø:B=26:K=36:GOSUB39Ø:GOTO37
    Ø                     :REM*139
39Ø FORL=JTOX:C=4:GOSUB395:GOSUB
    27Ø:C=13:GOSUB395:B=B+4Ø:NEX
    T:J=J+13:RETURN       :REM*245
395 FORP=BTOB+11:POKE55497+P,C:N
    EXT:RETURN            :REM*36
4ØØ PRINTT$;"{CRSR UP}":FORL=37T
    O4Ø:A1=ASC(MID$(AL$,L,1)):A2
    =ASC(MID$(AL$,L+4,1))
                          :REM*183
41Ø PRINTTAB(5);CHR$(A1);" ";C$(
    A1);TAB(22);CHR$(A2);" ";C$(
    A2):PRINT:NEXT        :REM*95
42Ø CHAR1,5,12,"WAIT (L){11 SPAC
    Es}"+C$(76):CHAR1,5,14,"INVI
    TE TO XMIT (K) "+C$(75):CHAR
    1,5,16,"END OF MESSAGE{5 SPA
    CEs}"+C$(41)          :REM*99
43Ø CHAR1,5,18,"END OF WORK{8 SP
    ACEs}"+C$(42):CHAR1,5,2Ø,"ER
    ROR{14 SPACEs}"+C$(43)
                          :REM*97
44Ø CHAR1,4,23,"{CTRL 4}<<<{2 SP
    ACEs}PRESS ANY KEY FOR MENU{
    2 SPACEs}>>>":GETKEYA$:GOTO2
    ØØ                    :REM*93
5ØØ GOSUB19Ø:R=1Ø          :REM*219
51Ø CHAR1,14,R,"{CTRL 8}{CTRL 9}
     RECEIVE MENU {CTRL Ø}":CHAR
    1,12,R+3,"1. RNDM CHARACTERS
    "                     :REM*53
52Ø CHAR1,12,R+5,"2. LIBRARY MES
    SAGE":CHAR1,12,R+7,"3. INPUT
     MESSAGE":CHAR1,12,R+9,"4. M
    AIN MENU"             :REM*4Ø
53Ø GETKEYA$:IFA$<"1"ORA$>"4"THE
    N53Ø:ELSEONVAL(A$)GOTO55Ø,59
    Ø,6ØØ,2ØØ             :REM*8Ø
55Ø M$=AL$:TEMPO4Ø         :REM*236
56Ø GOSUB19Ø:POKE2Ø8,Ø:L=INT(RND
    (.)*43+1):GOSUB27Ø:CHAR1,2Ø,
    8,"{CTRL 8}{COMD +}":GETKEYA
    $:CHAR1,2Ø,8,A$       :REM*156
57Ø C$=ML$+"{2 SPACEs}"+C$(ASC(M
    L$)):PRINT:PRINTTAB(2Ø-LEN(C
    $)/2);"{COMD 6}{CRSR DN}";C$
                          :REM*34
58Ø CHAR1,7,17,"{CTRL 4}<<<{2 SP
    ACEs}CONTINUE OR MENU{2 SPAC
    Es}>>>":GETKEYA$:IFA$="M"THE
    N5ØØ:ELSE56Ø          :REM*34
59Ø FORL=1TOINT(RND(.)*(Q-1)):M$
    =LB$(L):NEXT:GOTO61Ø  :REM*88
6ØØ GOSUB19Ø:INPUT"{COMD 6} MESS
    AGE";M$               :REM*2
61Ø GOSUB19Ø:INPUT"{COMD 6} WORD
    S PER MINUTE";T:TEMPOT*5
                          :REM*162
62Ø CHAR1,5,13,"{CTRL 8}<<< PRES
    S ANY KEY TO BEGIN >>>":GETK
    EYA$:GOSUB19Ø:FORL=1TOLEN(M$
    )                     :REM*42
63Ø GOSUB27Ø:PRINT"{HOME}{8 CRSR
     DNs}"TAB(L)" ";:IFASC(ML$)>
    32THENPRINT"{CRSR LF}{CTRL 8
    }{SHFT Z}"            :REM*12
64Ø NEXT:GOSUB19Ø:CHAR1,1,7,"{CO
    MD 6}"+M$:R=14:GOTO51Ø
                          :REM*254
7ØØ POKE54272,74:POKE54273,42:T=
    Ø:R=1Ø:GOSUB19Ø:CHAR1,14,7,"
    {CTRL 8}BEGIN SENDING":CHAR1
    ,8,22,"{CTRL 4}<<< PRESS 'M'
     FOR MENU >>>"        :REM*2ØØ
71Ø L=18:M$="":GETA$:IFA$="M"THE
    N2ØØ                  :REM*22Ø
72Ø IFA$=""THEN71Ø:ELSECHAR1,14,
    7,"{17 SPACEs}"       :REM*58
73Ø IFTI-D>3ØTHENT=T+1     :REM*1Ø8
74Ø D=TI:CHAR1,2Ø,3,F$(1):POKE54
    276,65:DO:LOOPUNTILPEEK(213)
    =88                   :REM*14
75Ø POKE54276,64:CHAR1,2Ø,3,F$(Ø
    ):K=2:IFTI-D<8THENK=1
                          :REM*194
76Ø CHAR1,L,7,"{CTRL 8}"+D$(K):L
    =L+K:M$=M$+D$(K):D=TI
                          :REM*14Ø
77Ø GETA$:IFA$<>""THEN74Ø:ELSEIF
    TI-D<15THEN77Ø        :REM*1Ø1
78Ø FORC=44TO9Ø:IFC$(C)<>M$THENN
    EXT:C=42              :REM*69
79Ø POKE2Ø8,Ø:CHAR1,T,R,"{COMD 6
    }"+CHR$(C):T=T+1:D=TI:IFT<37
    THEN71Ø               :REM*197
8ØØ T=1:R=R+1:IFR<2ØTHEN71Ø:ELSE
    7ØØ                   :REM*111
9ØØ DATA IT IS BETTER TO HAVE LO
    VED AND LOST THAN NEVER TO H
    AVE LOVED AT ALL.     :REM*169
9Ø5 DATA A JOURNEY OF A THOUSAND
     MILES BEGINS WITH BUT ONE S
    TEP.                  :REM*158
91Ø DATA WHATEVER THE MIND OF MA
    N CAN CONCEIVE AND BELIEVE I
    T CAN ACHIEVE.        :REM*2Ø9
915 DATA LEARN TO LISTEN TO THAT
     WHICH IS NOT SPOKEN.
                          :REM*116
92Ø DATA "IT IS NOT WHETHER YOU
    WIN OR LOSE THAT COUNTS, ITS
     HOW YOU PLAY THE GAME."
                          :REM*57
925 DATA X                 :REM*112
```

Listing 3.

C-128 replacement lines to use the joystick.

```
1Ø REM * FOR USE WITH JOY FIRE B
   UTTON                  :REM*28
72Ø IF(JOY(2)AND128)<>128THEN71Ø
    :ELSECHAR1,14,7,"{17 SPACEs}
    "                     :REM*172
74Ø D=TI:CHAR1,2Ø,3,F$(1):POKE54
    276,65:DO:LOOPUNTIL(JOY(2)AN
    D128)<>128            :REM*198
77Ø IF(JOY(2)AND128)=128THEN74Ø:
    ELSEIFTI-D<15THEN77Ø:REM*175
```

■



By JIM STRASMA

Do you have a problem or question about your Commodore computer? Commodore Clinic can help. Just send your question on a postcard *to:*

Jim Strasma
Commodore Clinic
PO Box 6100
Macomb, IL 61455

Queries are answered only through this column, and, due to the available space and the volume of mail, we select for publication only those questions that are likely to appeal to the majority of our readers.

HARDWARE

***Q:** I've upgraded to a C-128 computer and 1571 disk drive and have converted my 1541 to device 9, as detailed on page 82 of the April 1986 issue of* RUN. *The two drives are connected in series, and I know each one has to be addressed separately by its number—but that's all I know. Where can I find information on using the two drives?*

G. Lee Curtice
Rockport, TX

A: It sounds as though you've hooked up the two drives properly. Having done that, all you need to do to use the 1541 as device 9, instead of the 1571 as device 8, is to substitute a 9 in place of the 8 in your disk commands. For example, instead of typing:

```
DOPEN #1,"BOO",W,U8
```

to create a new file named BOO on the 1571, change the 8 to a 9:

```
DOPEN #1,"BOO",W,U9
```

and the file will be created on the 1541 instead.

The only source of confusion is that disk commands default to unit (device) 8. As a result, they are often written without mentioning either unit 8 or unit 9. In such cases, to use unit 9 you have to spell out the command and the unit number.

To use the second drive in CP/M mode on the C-128, have your commands designate drive B: instead of A:. Typing B: alone as a command will make the 1541 the default CP/M drive until you switch back to the 1571 by typing A:.

Even in C-64 mode, using device 9 is easy. Once again, replace the 8s in your commands with 9s. Thus:

```
OPEN 1,8,3,"0:BOO,S,W"
```

becomes:

```
OPEN 1,9,3,"0:BOO,S,W"
```

Note that you should always include the drive 0: specifier in 64 mode.

***Q:** I plan to buy a disk drive for my C-64, but I'm confused as to which is best. I've read that the 1541 has many flaws (head-banging, overheating, kicking out disks, chatter, and more), and I see ads for other drives claiming to be better. Should my first drive be a 1541 or not?*

S. W. Hall
Gray Court, SC

A: First, everything you have heard about the 1541 is true. It's still one of the least expensive intelligent disk drives available, and it has obvious deficiencies compared to most of its competitors. On the other hand, since its Kernal ROM is copyrighted, potential competitors can't license the ROM for their drives the way, for example, makers of clones of the IBM PC can license 100-percent-compatible BIOS ROMs.

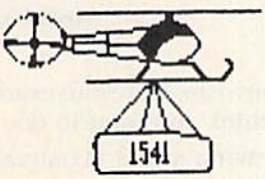
For normal commands this doesn't matter; all 1541 clones I've seen emulate the full Commodore command set properly. The problem arises when you try to run commercial software. Nearly all commercial C-64 software is still copy-protected, usually in ways that tie the programs specifically to the 1541. I often receive mail from people wondering why this or that program won't run on a particular 1541 clone, or even the 1571, and the answer is nearly always the same—copy protection. As long as Commodore owners tolerate protected programs, they'll continue to be tied to the 1541, despite the ready availability of better drives.

***Q:** Why won't my Commodore 802 act like a Commodore printer? It won't print from Doodle!, The Print Shop or GEOS, to name a few programs. Is there anything I can do to get more use out of the 802, or should I just junk it?*

Chuck Kinsey
Bellevue, WA

A: The 802 is another example of an otherwise good product that's been defeated by a prior standard. Although the 802 has several advantages over the 801, Commodore chose not

1541 MASH V2.0



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Custom Drives

You can customize your 1541 drive giving you added convenience. This booklet will show you how to move the power switch to the front of the drive; install a write protect switch (allowing you to write on the back of a disk without punching holes or removing any tapes); Install a device number switch (a must if you have two drives.) Easy step by step instructions include complete diagrams making the procedure a snap. Complete kit includes switches, wires, connectors.

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to make it fully software-compatible with the 801, especially in the way it handles graphics. Further, even though the protocol for doing graphics on the 802 has been known for a number of years, several graphics software vendors still ignore it. Probably all you can do is remind vendors of the sales to 802 owners that they're losing.

Q: Is it okay to leave a 1660 modem plugged in all the time? Will it affect the life of either the computer or the modem?

Tom Clausen
Lafayette, CA

A: If you never move your system even an inch or two, and don't have any other cartridges or interfaces connected to the system and using its power, you can leave the modem plugged in. In fact, under those circumstances it would be best to do so, to avoid wearing out the thin gold contacts on the port. On the other hand, if there's even the slightest chance your keyboard unit will shift position, you should keep the modem unplugged until needed. I learned this, much to my sorrow, by shorting out the port after cleaning around my computer.

Fortunately, there is a solution that doesn't require continual unplugging. Master Software (6 Hillery Court, Randallstown, MD 21133) sells a 4-foot user-port extension cable for $30 postpaid. The flexibility of the cable protects against shorts when the system is being moved.

Q: I have a 1541 disk drive that was made in Japan; my friend bought a 1541 recently, but his was made in Hong Kong. Is there anything wrong with this?

Rene Del Valle
Queens, NY

A: Not unless you're one of the many workers laid off by American disk manufacturers in the past year due to competition from the Far East. Commodore is a multinational firm, with suppliers and factories in countries all around the world.

Q: I operate a BBS 24 hours a day. I'd like to know how to keep the computer from getting hot. I built a fan for my power supply, but the computer itself still heats up.

Gus Daniels
McAllen, TX

A: A certain amount of heat isn't necessarily bad for your computer; its chips are designed to work properly up to about 150 degrees Fahrenheit. (As owners of older VIC-20s already know, the VIC works properly even when the keyboard is unpleasantly hot to the touch.) However, since elevated heat does "age" chips, you still may want to cool things down.

With your machine dedicated entirely to hosting a BBS, why not just remove its cover, or at least raise it a couple of inches? A plastic case is a poor conductor of heat, so eliminating it will lower internal temperatures by several degrees.

PROGRAMMING

Q: I have a C-64 and want to write a trivia game, but I don't have the slightest idea where to start. Would you please write a two-question trivia game to get me going?

Scott Heitkamp
St. Henry, OH

A: Here goes:

```
100 READ Q$,C$
110 IF Q$ = "/" THEN 200
120 PRINT Q$
130 INPUT A$
140 IF A$ = C$ THEN 170
150 PRINT "SORRY, THE ANSWER IS";C$
160 GOTO 100
170 SC = SC + 1
180 PRINT "RIGHT! YOUR SCORE IS";SC
190 GOTO 100
200 PRINT "THANKS FOR PLAYING"
210 END
220 DATA "WHAT WAS THE CASE OF THE
    FIRST COMMODORE COMPUTER
    MADE OF","WOOD"
230 DATA "IN WHAT COUNTRY WAS THE
    VIC FIRST SOLD", "JAPAN"
240 DATA "/","/"
```

Just be sure to follow your last question with a line like 240 above, so the program will know when to quit.

Q: I'm using a variable to load a program, and it works fine. However, when I want to load a third program, I need to use the first variable plus a new one. Can variables be used together to load a program on the C-64?

Travis Sonsalla
Arcadia, WI

A: They sure can. Here's an example of what I think you want to do:

```
100 INPUT "WHAT SHALL I LOAD";A$
110 LOAD "0:" + A$,8
```

Then, in your second program, you would add to the name before loading the third program:

```
100 PRINT "WHAT COMES AFTER ";A$
110 INPUT "IN YOUR NEXT LOAD";B$
120 LOAD "0:" + A$ + B$,8
```

When you load one program from another like this, there are two key things to remember. First, use only dynamic variables. These are variables whose values are entered via Input statements, whose values have changed since they were first assigned or whose values result from a concatenation (such as, A$ + "ONE" + ""), as opposed to static strings like A$ = "ONE" that never change. Second, be sure the first program is the longest one, or else fool Basic into thinking it is.

Q: I've often wondered how Commodore calculates the number of disk blocks needed by files. The following formula works for program files, although I'm not sure why:

```
PRINT -INT(-BYTES/(256 - 2))
```

Can you explain this formula, and also how the lengths of other types of files are calculated?

Emmett Ferretti
Birmingham, AL

A: The essential idea is that all files are created by the computer byte by byte, and are sent in streams to the disk drive to be stored. However, they are stored by the drive in blocks of 256 bytes, with the last block only partly full. Blocks are connected to one another within a file by a system of link pointers, each of which takes up the first two bytes of its block. If a stream of bytes is destined for a program file, its load address will take up the first two bytes after the link pointer in the first block. Thus, the first block in a program file can hold only 252 bytes of the actual program. All other blocks except the last in either a program or sequential file will

hold 254 bytes. The last block will contain anywhere from 1 to 254 bytes.

Storage for relative files is complicated by their need for one or more additional blocks of pointers to point to individual records within a file. These are allocated at the rate of one per 120 blocks of data in each relative file, in addition to the data blocks themselves.

Q: My C-64 sometimes has trouble subtracting numbers. For example:

45 – 44.07 = .929999992
20 – 20.66 = –.660000002

This fouls up one of my programs, so how can I correct it?

Robert Corson
Mt. Laurel, NJ

A: Such errors are a result of converting numbers from decimal to binary before the arithmetic operation and back to decimal afterwards, along with the limited floating-point precision of the computer. You'll find the same problem in most Microsoft Basics. The cure is to round the output number to a few less digits of precision before printing it. Assuming your output numbers are in variable A, you can correct them to the nearest four decimal places with:

```
100 A2 = INT (A * 1E4 + .5) / 1E4
```

For more or less precision in the result, vary the digit following E in both places where it appears in the equation.

SOFTWARE

Q: I'm writing Commodore a letter asking for a GEOS program because I've purchased a VIC-20, two C-64s, a C-128, a 1541 disk drive and Commodore joysticks. I would like their address for the letter.

Paul Silverstein
Ukiah, CA

A: It does sound like you've paid your dues, Paul, although Commodore is not noted for offering free upgrades. On the other hand, since Commodore has announced that future 64C owners will receive GEOS automatically, they could probably arrange to offer it inexpensively to present owners as well, and GEOS would then no longer need to be copy-protected. Anyone in favor of that notion should write to Commodore at 1200 Wilson Drive, West Chester, PA 19380.

Q: I'd like some information about the COBOL offered by Digital Research for CP/M mode on the C-128. Is it a limited subset of ANSI-74 COBOL, or is it complete? How much does it cost, and how would I order it? If you have room to answer only one question, what is Digital Research's mailing address?

Ted Chidester
Santa Fe, NM

A: All microcomputer versions of COBOL are still subsets of that massive language, although they're often complete enough for likely needs. Digital Research describes their Level II COBOL as enabling micros "to compile and run programs written in full ANSI '74 COBOL." If the $1600 list price doesn't scare you off, you can reach them at 60 Garden Court, Monterey, CA 93942; 408-649-3896.

Q: Our campus ministry has been offered a Commodore 8032 computer with disk drive and monitor for $150. My question is whether there are any word processing, datafile and accounting programs available for this model.

Rich Nischan
Wheelersburg, OH

A: Yes, several excellent programs are still available, although probably only directly from the software manufacturers now. Super Office, a combination of Superscript (a.k.a. Easy Script) and Superbase, from Precision Software; PaperClip and The Consultant from Batteries Included and CMS Accounting from CMS Software Systems were among the best programs offered for the 8032, and their vendors are all still in business. Precision Software products, which come from England, are distributed in the U.S. by Progressive Peripherals & Software, 464 Kalamath St., Denver, CO 80204; 303-825-4144. You can contact CMS Software Systems at 2204 Camp David, Mesquite, TX 75149; 214-289-0677.■

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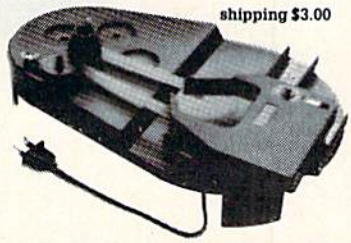

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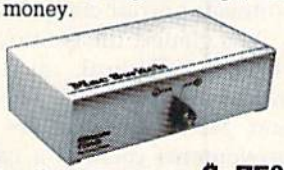

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The Gemini II And NL-10 Printers

The Low-Cost Choice Is Yours: Many Print Capabilities Or Software Compatibility

The Gemini II is a Commodore-dedicated printer that's equipped with a built-in interface and a removable six-pin serial cable.

The NL-10 is neither Commodore-dedicated, nor is it a conventional parallel printer. Instead, it is designed to interface to Commodore computers with a special Star Micronics cartridge, which plugs into the back of the printer while a separate serial cable connects to your computer system.

At a glance, the Gemini II and NL-10 look identical, and both share hardware improvements over earlier Star Micronics printers. These improvements include a cartridge ribbon instead of a spool ribbon and a detachable paper guide for single-feed forms. In addition, the removable tractor feed mechanism has been replaced by a nonremovable, adjustable tractor unit. This reduces wasted paper by pushing, rather than pulling, continuous-feed paper through the printers.

Although the two printers seem to have much in common, an examination of their printing abilities reveals a considerable internal difference. The NL-10, lacking the constraints of Commodore dedication, has many more features than the Gemini II. In fact, it offers all of the Gemini II's print capabilities, plus much more.

NL-10 Print Features

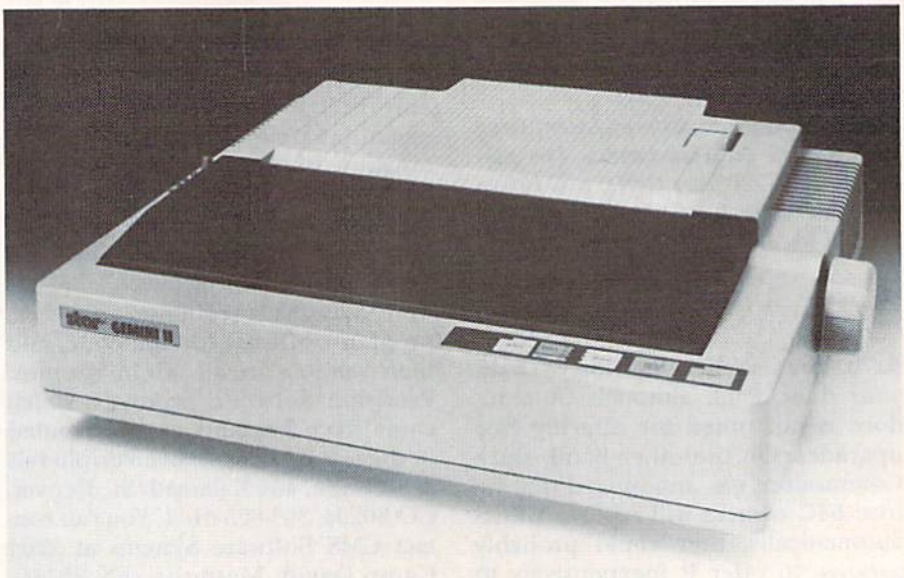
The NL-10 possesses as many print features as you're likely to find on any low-end dot matrix printer. The Commodore interface allows easy software activation and control of the NL-10's features with documented Basic commands. However, since it's not a true Commodore-dedicated printer, escape code CHR$(27) is required at the beginning of most commands.

This printer can be programmed to accept a single command to select a default Print mode, which sets the print pitch, underline features and emphasized, bold or expanded print. It also has a convenient hex dump characteristic, which programmers will appreciate, and a true ASCII mode that, when activated, requires you to enter codes that differ from those used in the NL-10's Commodore mode.

You can choose between the business and graphics character sets when printing with the default Commodore characters. A simple command will replace the Commodore characters with an ASCII character set.

The NL-10 offers capabilities that include seven-pin graphics in 480 and 960 dots-per-line density and in 480 dots-per-line reverse graphics printing. There is also an eight-pin graphics mode that offers 480, 960 and 1920 dots-per-line printing.

The printer possesses the usual assortment of international characters found on most Star Micronics printers. Three print pitches, bold and emphasized print and an NLQ mode that features a density of 18 × 23 dots are included. This relatively high dot



Gemini II printer.

density produces characters that are comparable to the so-called letter-quality characters found on high-end dot matrix printers.

Other print features include superscripts, subscripts, proportional character spacing, programmable line spacing and an italic character set. Double- and quadruple-size character printing is also available.

With the NL-10, most paper-handling functions have been moved from their usual DIP switch locations to the control panel. From there, you can alter settings such as right, left and top-of-form margins, all of which can be controlled from the customary line- and form-feed buttons. The control panel also lets you select the print pitch, NLQ and bold print settings. Small LED-type lights are illuminated next to the name of the activated print pitch or mode.

Performance-wise, the NL-10 has a print speed of 120 cps in Draft mode and 30 cps in NLQ mode. It is relatively quiet and, even after several months of operation, the ribbon has not shown significant fading or wear.

The printer comes with two informative manuals. One brief, non-computer-specific manual explains how to interface the NL-10 with your computer and perform preventive maintenance. A second 160-page manual accompanies printers equipped with an interface for Commodores.

Software Compatibility

Both programmers and nonprogrammers can benefit from the NL-10's graphics capabilities. It works well with graphics software, CAD software and high- and low-resolution screen dumps for the C-64 and C-128.

I have used the NL-10 with business software packages that utilize bit-mapped screen dumps, and they all worked fine. The design of the printer is sure to reduce the likelihood of software incompatibility.

My long-term use has convinced me that the NL-10 is one of the more software-friendly, third-party printers on the market.

Gemini II Features

The Gemini II has the NL-10's speed in its various print modes. Its features include bold and emphasized print, superscripts and subscripts, three print pitches and programmable line spacing.

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Hardware Gallery

The Gemini II has a control panel similar to that of the NL-10, except that it has one less button and a different configuration. The same LED-type lights display the current mode at a glance.

The Gemini II's NLQ mode has a slightly lower dot matrix density than the NL-10. Its 17 × 11 dots per character gives the NLQ characters "squarer" curves and more of a computer-font appearance.

The Gemini II has important features such as a hex dump, international characters and bidirectional and unidirectional printing. Some of the advanced printing options enjoyed by the NL-10, such as an italic character set, ASCII mode and quadruple-size printing, are not available here.

The print head has the same number of vertical pins—nine—as the NL-10; however, the Gemini II can only access seven pins while the NL-10 can access eight in Graphics mode.

Since the Gemini II is a Commodore-dedicated printer, it offers both exceptional 1525 emulation and software compatibility. In an effort to duplicate MPS-803 and 1525 print, the characters in Draft mode even lack descenders.

This is pica.
This is elite.
This is condensed.
This is boldface.
These are subscripts. These are superscripts.
Quad is also possible.

Samples of different print available on the NL-10.

Summary

In a side-by-side comparison, the NL-10 seems to be the better printer in many respects. Its multitude of print options (not found on the Gemini II) makes it the preferred printer for programmers.

Despite the Gemini II's shortcomings, however, its excellent software compatibility demands consideration from those who want a high-quality dot matrix printer. The Gemini II will handle virtually any graphics, business or correspondence printing task the average Commodore computerist is likely to encounter.

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In the final analysis, it's up to the user to determine which printer may best meet his needs. Either of these machines is a worthwhile investment. *(Star Micronics, 200 Park Ave., Suite 3510, New York, NY 10166. Gemini II, $319; NL-10 with interface, $379.)*

Tim Walsh
***RUN* Staff**

MicroFlyte Joystick

Let This Accessory Put You In a Flight Pattern That You'll Never Want to Leave

A successful accessory to a game of legendary status must not only add to the enjoyment of the game, but also enhance and improve it.

Microcube Corporation has managed to do this with MicroFlyte Joystick. Now designed specifically for SubLogic's Flight Simulator II, it will later include optional drivers for SubLogic's Jet and MicroProse's F-15 Strike Eagle.

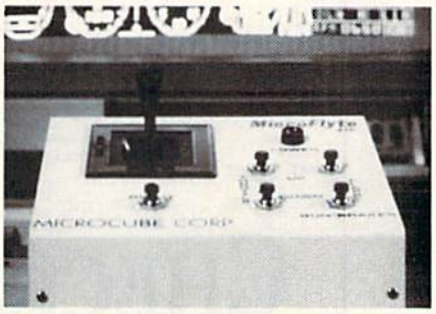
This joystick has controls centering on both axes and, because it is a pot-type stick instead of the conventional switch type, there is little backlash and more precise control. Other features on the large but lightweight box include pushbuttons to increase or decrease your engine throttle and two buttons to control the movements of your flaps.

MicroFlyte moves all the most-used controls to a panel on the joystick base and labels them, making it unnecessary for you to set up a memory system to work with your keyboard.

With MicroFlyte, you simply push the stick gently to achieve the proper degree of turn or bank, then release it and watch your indicator center itself. I've been able to attain a level horizon much more easily than ever before.

To use MicroFlyte, you must first load and run the driver disk that is included in the package. After about 10 seconds, you are requested to insert your Flight Simulator II disk, which is then automatically booted. Because it is a routine residing in an otherwise unused part of the C-64's memory, the driver will not alter or affect your Flight Simulator II disk in any way.

While $59.95 may seem high for a single-purpose joystick, the real value is measured by how much you enjoy flying Flight Simulator II. If you are an occasional user, MicroFlyte will replace the need for committing certain keyboard commands to memory. If you are a regular flyer, you'll enjoy the accuracy and ease of MicroFlyte. *(Microcube Corp., PO Box 488, Leesburg, VA 22075, $59.95.)*



MicroFlyte joystick.

Ervin Bobo
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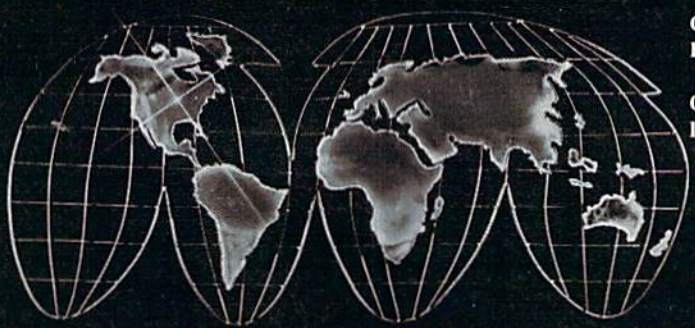

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CHECKSUMS FOR *RUN* 1985 PROGRAMS

Last February, in response to many reader inquiries, we began a series of checksum listings for programs published in 1985 before our C-64 checksum program, 64 Perfect Typist, appeared in September '85. Working backwards, we have so far covered August, July, June and May. Below, you will find the April programs' checksum listings.

To use the checksums, you must first load and run 64 Perfect Typist (see How to Type Listings, on page 110); then get out your April issue and begin typing in any program you find in the listings below. Every time you hit the return key, a number from 0 to 255 will appear. If you enter a line correctly, the number following the ":REM" next to the line number will appear.*

If you have already entered one of the programs and desire to check it for accuracy, simply enter 64 Perfect Typist, list lines individually or in small groups and position the cursor on the line you want to check. Next, press the return key, and, if you've entered the line correctly, the number that appears below the line will match the number following the ":REM" in the listings.*

You can look forward to seeing more of these listings of 1985 programs in subsequent issues of RUN.

Sound Sampler, by Bruce Bartlett; April, p. 102.

```
5     :REM*251
10    :REM*172
20    :REM*54
25    :REM*113
30    :REM*172
31    :REM*7
32    :REM*200
33    :REM*9
34    :REM*252
35    :REM*43
36    :REM*16
37    :REM*137
38    :REM*220
39    :REM*129
40    :REM*188
41    :REM*109
42    :REM*84
43    :REM*63
44    :REM*6
45    :REM*235
46    :REM*4
47    :REM*31
49    :REM*55
50    :REM*102
55    :REM*97
60    :REM*72
70    :REM*74
72    :REM*80
75    :REM*23
77    :REM*91
80    :REM*208
100   :REM*182
110   :REM*32
120   :REM*228
130   :REM*196
140   :REM*252
150   :REM*132
160   :REM*116
200   :REM*240
210   :REM*70
220   :REM*202
230   :REM*34
240   :REM*152
250   :REM*206
300   :REM*113
310   :REM*75
320   :REM*189
330   :REM*89
340   :REM*255
350   :REM*235
360   :REM*229
370   :REM*83
400   :REM*211
410   :REM*221
420   :REM*17
430   :REM*189
440   :REM*67
450   :REM*77
460   :REM*73
470   :REM*213
500   :REM*139
510   :REM*197
520   :REM*88
530   :REM*96
540   :REM*12
550   :REM*164
560   :REM*18
600   :REM*120
610   :REM*208
620   :REM*192
630   :REM*238
640   :REM*144
650   :REM*8
660   :REM*148
700   :REM*52
710   :REM*144
720   :REM*242
730   :REM*70
740   :REM*82
750   :REM*26
760   :REM*32
800   :REM*211
810   :REM*63
820   :REM*163
830   :REM*79
840   :REM*135
850   :REM*91
860   :REM*219
870   :REM*103
900   :REM*211
910   :REM*151
920   :REM*243
930   :REM*243
940   :REM*145
950   :REM*69
1000  :REM*139
1010  :REM*85
1020  :REM*69
1030  :REM*76
1040  :REM*32
1050  :REM*242
1100  :REM*52
1110  :REM*10
1120  :REM*112
1130  :REM*84
1140  :REM*170
1150  :REM*44
1160  :REM*136
1200  :REM*212
1210  :REM*14
1220  :REM*134
1230  :REM*160
1240  :REM*88
1250  :REM*98
1260  :REM*196
1300  :REM*171
1310  :REM*115
1320  :REM*239
1330  :REM*67
1340  :REM*1
1350  :REM*117
1360  :REM*33
1370  :REM*219
1380  :REM*61
1400  :REM*19
1410  :REM*89
1420  :REM*31
1430  :REM*157
1440  :REM*47
1450  :REM*43
1460  :REM*57
1500  :REM*255
1510  :REM*121
1520  :REM*177
1530  :REM*61
1540  :REM*22
1550  :REM*140
1560  :REM*198
1570  :REM*100
1580  :REM*174
1590  :REM*194
1600  :REM*28
1610  :REM*106
1620  :REM*62
1630  :REM*224
1640  :REM*172
1650  :REM*76
1660  :REM*254
1670  :REM*236
1700  :REM*210
1710  :REM*94
1720  :REM*82
1730  :REM*28
1740  :REM*254
1750  :REM*216
1760  :REM*122
1770  :REM*68
1780  :REM*38
1790  :REM*162
```

Graph Maker 64, by Doug Smoak; April, p. 110.

```
1       :REM*151
2        :REM*52
3       :REM*237
4       :REM*236
5        :REM*77
6       :REM*226
7         :REM*9
8        :REM*58
9       :REM*159
1Ø      :REM*244
2Ø      :REM*212
3Ø      :REM*162
4Ø      :REM*16Ø
5Ø      :REM*122
6Ø       :REM*9Ø
7Ø       :REM*92
8Ø      :REM*188
9Ø      :REM*2Ø4
1ØØ     :REM*176
11Ø       :REM*6
12Ø      :REM*96
13Ø      :REM*32
14Ø     :REM*15Ø
15Ø     :REM*2Ø8
16Ø      :REM*8Ø
17Ø     :REM*15Ø
18Ø      :REM*3Ø
19Ø      :REM*8Ø
2ØØ     :REM*176
21Ø     :REM*19Ø
22Ø     :REM*196
23Ø      :REM*2Ø
24Ø     :REM*242
25Ø     :REM*226
26Ø      :REM*77
27Ø     :REM*247
28Ø      :REM*87
29Ø      :REM*57
3ØØ       :REM*7
31Ø     :REM*113
32Ø     :REM*141
33Ø     :REM*211
34Ø     :REM*139
35Ø      :REM*35
36Ø      :REM*81
37Ø     :REM*1Ø7
38Ø     :REM*1Ø1
39Ø      :REM*29
4ØØ      :REM*29
41Ø     :REM*155
42Ø     :REM*215
43Ø     :REM*151
44Ø      :REM*95
45Ø     :REM*171
46Ø      :REM*93
47Ø     :REM*193
48Ø     :REM*187
49Ø     :REM*145
5ØØ     :REM*115
51Ø      :REM*17
52Ø     :REM*238
53Ø     :REM*18Ø
54Ø     :REM*218
55Ø      :REM*16
56Ø       :REM*8
57Ø      :REM*36
58Ø     :REM*18Ø
59Ø      :REM*68
6ØØ      :REM*32
61Ø     :REM*1Ø6
62Ø     :REM*19Ø
63Ø     :REM*156
64Ø     :REM*11Ø
65Ø      :REM*92
66Ø     :REM*2Ø6
67Ø      :REM*3Ø
68Ø     :REM*2Ø4
69Ø     :REM*12Ø
7ØØ     :REM*218
71Ø      :REM*88
72Ø     :REM*226
73Ø      :REM*86
74Ø     :REM*168
75Ø     :REM*25Ø
76Ø     :REM*2Ø4
77Ø      :REM*63
78Ø     :REM*247
79Ø     :REM*129
8ØØ       :REM*11
81Ø     :REM*221
82Ø     :REM*231
83Ø     :REM*177
84Ø      :REM*15
85Ø      :REM*61
86Ø      :REM*51
87Ø      :REM*91
88Ø      :REM*35
89Ø     :REM*1Ø1
9ØØ      :REM*211
91Ø     :REM*121
92Ø      :REM*65
93Ø     :REM*217
94Ø      :REM*77
95Ø     :REM*123
96Ø      :REM*45
97Ø       :REM*9
98Ø      :REM*93
99Ø      :REM*29
1ØØØ    :REM*255
1Ø1Ø     :REM*19
1Ø2Ø     :REM*231
1Ø3Ø     :REM*228
1Ø4Ø     :REM*252
1Ø5Ø     :REM*116
1Ø6Ø      :REM*82
1Ø7Ø      :REM*48
1Ø8Ø      :REM*36
1Ø9Ø     :REM*16Ø
11ØØ      :REM*56
111Ø     :REM*2Ø8
112Ø     :REM*152
113Ø      :REM*54
114Ø      :REM*96
115Ø     :REM*242
116Ø     :REM*116
117Ø     :REM*152
118Ø      :REM*38
119Ø      :REM*76
12ØØ     :REM*218
121Ø      :REM*98
122Ø     :REM*176
123Ø     :REM*228
124Ø     :REM*196
125Ø     :REM*238
126Ø     :REM*212
127Ø     :REM*212
128Ø     :REM*121
129Ø      :REM*57
13ØØ     :REM*233
131Ø     :REM*223
132Ø       :REM*5
133Ø      :REM*47
134Ø     :REM*243
135Ø     :REM*125
136Ø     :REM*117
137Ø     :REM*255
138Ø      :REM*13
139Ø      :REM*81
14ØØ      :REM*35
141Ø      :REM*81
142Ø      :REM*75
143Ø     :REM*131
144Ø     :REM*159
145Ø     :REM*151
146Ø     :REM*159
147Ø     :REM*113
148Ø       :REM*1
149Ø     :REM*161
15ØØ     :REM*123
151Ø     :REM*177
152Ø      :REM*55
153Ø     :REM*213
154Ø      :REM*96
155Ø     :REM*172
156Ø      :REM*32
157Ø      :REM*16
158Ø     :REM*114
159Ø      :REM*36
16ØØ     :REM*2ØØ
161Ø     :REM*176
162Ø     :REM*246
163Ø     :REM*228
164Ø      :REM*92
165Ø     :REM*2ØØ
```

Charting Your Future, by Alan Wheeler; April, p. 30.

```
5        :REM*81
1Ø       :REM*18
2Ø        :REM*Ø
3Ø      :REM*134
4Ø       :REM*84
5Ø      :REM*128
6Ø      :REM*168
7Ø      :REM*162
8Ø      :REM*114
9Ø       :REM*54
1ØØ      :REM*48
11Ø     :REM*168
12Ø     :REM*19Ø
13Ø     :REM*182
135     :REM*215
137     :REM*247
14Ø     :REM*19Ø
145     :REM*167
15Ø      :REM*6Ø
155     :REM*213
16Ø     :REM*178
17Ø     :REM*226
18Ø      :REM*36
19Ø      :REM*74
2ØØ     :REM*118
21Ø      :REM*92
22Ø     :REM*122
23Ø      :REM*32
24Ø     :REM*138
25Ø     :REM*172
26Ø     :REM*149
27Ø     :REM*151
28Ø      :REM*11
29Ø       :REM*5
295      :REM*12
3ØØ     :REM*143
3Ø5     :REM*118
31Ø      :REM*59
32Ø      :REM*71
33Ø       :REM*9
34Ø     :REM*197
35Ø      :REM*23
36Ø     :REM*151
37Ø     :REM*125
38Ø       :REM*1
39Ø      :REM*13
4ØØ      :REM*95
41Ø      :REM*49
42Ø      :REM*83
43Ø     :REM*145
44Ø      :REM*45
45Ø      :REM*41
46Ø     :REM*217
47Ø      :REM*33
48Ø     :REM*251
49Ø      :REM*97
5ØØ     :REM*139
51Ø      :REM*97
515      :REM*169
52Ø      :REM*194
53Ø     :REM*2ØØ
54Ø      :REM*24
55Ø      :REM*7Ø
56Ø     :REM*156
57Ø     :REM*154
58Ø      :REM*86
585      :REM*65
59Ø     :REM*18Ø
6ØØ     :REM*18Ø
61Ø      :REM*3Ø
62Ø     :REM*178
63Ø     :REM*2Ø6
64Ø      :REM*64
65Ø     :REM*1Ø2
66Ø     :REM*16Ø
67Ø      :REM*38
68Ø     :REM*17Ø
69Ø     :REM*192
7ØØ      :REM*14
71Ø     :REM*234
72Ø     :REM*164
73Ø      :REM*82
74Ø     :REM*148
75Ø      :REM*12
76Ø     :REM*192
77Ø     :REM*197
78Ø      :REM*43
79Ø      :REM*99
8ØØ     :REM*177
81Ø      :REM*15
82Ø     :REM*157
83Ø      :REM*67
84Ø      :REM*23
85Ø       :REM*5
86Ø       :REM*9
```

Teacher's Pet, by Frank Colosimo; April, p. 54.

```
1Ø       :REM*98
3Ø       :REM*14
5Ø       :REM*66
6Ø       :REM*58
7Ø       :REM*16
8Ø      :REM*168
9Ø      :REM*1Ø8
1ØØ     :REM*2Ø4
12Ø      :REM*86
13Ø      :REM*62
14Ø      :REM*56
15Ø     :REM*1Ø2
16Ø      :REM*32
17Ø      :REM*96
18Ø     :REM*212
19Ø      :REM*68
2ØØ      :REM*16
21Ø      :REM*56
22Ø       :REM*6
23Ø     :REM*194
24Ø     :REM*1Ø2
25Ø     :REM*158
26Ø     :REM*131
27Ø     :REM*235
28Ø      :REM*11
29Ø     :REM*141
3ØØ     :REM*229
31Ø      :REM*39
32Ø     :REM*249
33Ø      :REM*25
34Ø     :REM*195
36Ø     :REM*113
37Ø      :REM*49
38Ø     :REM*219
39Ø     :REM*139
41Ø     :REM*1Ø9
42Ø      :REM*79
43Ø     :REM*195
44Ø     :REM*251
45Ø     :REM*251
46Ø     :REM*125
47Ø     :REM*217
49Ø     :REM*245
5ØØ      :REM*23
51Ø     :REM*179
52Ø     :REM*228
54Ø      :REM*18
55Ø     :REM*1Ø4
57Ø      :REM*34
58Ø       :REM*Ø
6ØØ     :REM*164
61Ø     :REM*11Ø
63Ø     :REM*134
64Ø     :REM*238
65Ø     :REM*15Ø
66Ø     :REM*216
67Ø      :REM*98
69Ø     :REM*226
71Ø     :REM*232
72Ø     :REM*214
73Ø      :REM*96
74Ø     :REM*128
75Ø     :REM*25Ø
77Ø       :REM*7
78Ø      :REM*53
81Ø     :REM*219
82Ø     :REM*129
84Ø      :REM*25
85Ø      :REM*71
87Ø      :REM*31
88Ø     :REM*195
89Ø     :REM*149
9ØØ     :REM*193
92Ø     :REM*199
93Ø      :REM*43
94Ø     :REM*169
96Ø     :REM*183
97Ø      :REM*57
98Ø      :REM*45
```

Celestial Swami, by Jim Bernard; April, p. 35.

Listing 1. Celestial Swami Loader program.

```
1Ø    :REM*22     16Ø   :REM*238    3ØØ   :REM*161    51Ø   :REM*121    65Ø   :REM*66
2Ø    :REM*52     17Ø   :REM*194    31Ø    :REM*25    52Ø    :REM*38    66Ø   :REM*94
3Ø    :REM*2Ø     18Ø   :REM*238    32Ø    :REM*57    53Ø   :REM*138    67Ø  :REM*1ØØ
4Ø   :REM*132     19Ø   :REM*156    33Ø    :REM*23    54Ø   :REM*152    68Ø  :REM*142
5Ø   :REM*1Ø4     2ØØ   :REM*126    34Ø   :REM*123    55Ø   :REM*244    69Ø   :REM*5Ø
6Ø    :REM*98     21Ø   :REM*162    35Ø    :REM*49    56Ø   :REM*13Ø    7ØØ   :REM*7Ø
7Ø   :REM*246     22Ø     :REM*2    36Ø   :REM*251    57Ø   :REM*212    71Ø  :REM*214
8Ø   :REM*232     23Ø   :REM*12Ø    37Ø   :REM*167    58Ø   :REM*168    72Ø  :REM*118
1ØØ   :REM*54     24Ø   :REM*1Ø4    38Ø   :REM*191    59Ø    :REM*14    73Ø   :REM*22
11Ø  :REM*196     25Ø    :REM*96    39Ø    :REM*97    6ØØ   :REM*1Ø6    74Ø  :REM*1Ø4
12Ø   :REM*72     26Ø     :REM*1    4ØØ    :REM*39    61Ø    :REM*92    75Ø  :REM*164
13Ø  :REM*246     27Ø    :REM*13    41Ø    :REM*99    62Ø   :REM*116    76Ø  :REM*242
14Ø  :REM*142     28Ø   :REM*177    42Ø   :REM*131    63Ø   :REM*2Ø4    77Ø   :REM*53
15Ø   :REM*72     29Ø    :REM*67    5ØØ   :REM*131    64Ø   :REM*252
```

Listing 2. Celestial Swami Program.

```
1Ø     :REM*6     9Ø    :REM*12Ø    19Ø   :REM*116    32Ø    :REM*49    53Ø   :REM*178
2Ø   :REM*144     99     :REM*79    199     :REM*1    33Ø   :REM*155    54Ø    :REM*66
3Ø   :REM*146     1ØØ   :REM*238    2ØØ    :REM*4    34Ø    :REM*31    55Ø    :REM*4Ø
4Ø   :REM*2Ø2     11Ø    :REM*88    21Ø  :REM*17Ø    35Ø    :REM*55    6ØØ   :REM*98
5Ø   :REM*13Ø     12Ø    :REM*92    22Ø    :REM*32    36Ø   :REM*125    61Ø   :REM*96
55   :REM*2Ø5     13Ø    :REM*58    23Ø   :REM*136    37Ø   :REM*2Ø3    62Ø    :REM*1Ø
57   :REM*247     14Ø    :REM*44    24Ø   :REM*238    38Ø    :REM*85    63Ø   :REM*212
6Ø    :REM*8Ø     15Ø    :REM*38    25Ø    :REM*62    39Ø   :REM*193    64Ø   :REM*17Ø
7Ø    :REM*12     16Ø   :REM*168    299   :REM*1Ø2    5ØØ   :REM*249    65Ø   :REM*1ØØ
75   :REM*149     17Ø   :REM*156    3ØØ   :REM*1Ø9    51Ø   :REM*169
8Ø    :REM*9Ø     18Ø   :REM*156    31Ø     :REM*5    52Ø   :REM*25Ø
```

The Number Puzzle, by Zoltan Szepesi; April, p. 88.

```
1Ø     :REM*8     28Ø    :REM*25    63Ø   :REM*126    97Ø   :REM*187    133Ø   :REM*243
2Ø    :REM*96     29Ø    :REM*17    64Ø   :REM*1Ø4    98Ø    :REM*99    134Ø   :REM*255
3Ø   :REM*19Ø     3ØØ    :REM*53    65Ø   :REM*24Ø    99Ø   :REM*113    135Ø   :REM*227
4Ø   :REM*116     31Ø    :REM*79    66Ø    :REM*36   1ØØØ   :REM*243    136Ø    :REM*81
5Ø    :REM*2Ø     32Ø   :REM*231    67Ø   :REM*244   1Ø1Ø    :REM*41    137Ø    :REM*13
6Ø    :REM*68     33Ø    :REM*85    68Ø   :REM*2Ø2   1Ø2Ø   :REM*155    138Ø    :REM*37
7Ø   :REM*114     34Ø    :REM*51    7ØØ     :REM*Ø   1Ø3Ø    :REM*12    139Ø   :REM*143
8Ø   :REM*236     35Ø   :REM*165    71Ø   :REM*228   11ØØ   :REM*214    14ØØ   :REM*197
9Ø   :REM*1Ø2     36Ø   :REM*243    72Ø   :REM*138   111Ø   :REM*124    141Ø   :REM*119
1ØØ  :REM*182     37Ø   :REM*2Ø3    73Ø   :REM*12Ø   112Ø   :REM*128    142Ø    :REM*93
11Ø   :REM*54     38Ø    :REM*45    74Ø   :REM*194   113Ø   :REM*16Ø    143Ø   :REM*189
12Ø  :REM*232     4ØØ   :REM*223    75Ø   :REM*132   114Ø    :REM*14    144Ø    :REM*83
13Ø  :REM*176     41Ø    :REM*71    76Ø    :REM*5Ø   115Ø   :REM*158    145Ø   :REM*153
14Ø  :REM*16Ø     42Ø   :REM*175    77Ø    :REM*73   116Ø     :REM*Ø    146Ø   :REM*143
15Ø   :REM*9Ø     43Ø    :REM*39    78Ø    :REM*31   117Ø   :REM*17Ø    147Ø    :REM*83
16Ø  :REM*124     5ØØ   :REM*249    79Ø   :REM*177   118Ø   :REM*214    148Ø    :REM*41
17Ø  :REM*2Ø8     51Ø    :REM*43    8ØØ   :REM*185   119Ø    :REM*9Ø    149Ø    :REM*17
18Ø   :REM*24     52Ø   :REM*22Ø    81Ø   :REM*245   12ØØ   :REM*1ØØ    15ØØ   :REM*165
19Ø  :REM*252     53Ø    :REM*96    82Ø   :REM*197   121Ø   :REM*11Ø    151Ø   :REM*177
2ØØ  :REM*184     54Ø   :REM*1Ø2    83Ø   :REM*123   122Ø   :REM*1Ø8    152Ø   :REM*247
21Ø   :REM*62     55Ø   :REM*124    9ØØ   :REM*235   123Ø    :REM*36    153Ø    :REM*39
22Ø   :REM*58     56Ø    :REM*78    91Ø    :REM*43   124Ø    :REM*46    154Ø     :REM*2
23Ø  :REM*236     57Ø   :REM*118    92Ø   :REM*169   125Ø    :REM*56    155Ø   :REM*176
24Ø  :REM*138     58Ø    :REM*14    93Ø   :REM*175   126Ø    :REM*94    156Ø   :REM*122
25Ø  :REM*224     6ØØ    :REM*1Ø    94Ø   :REM*2Ø9   13ØØ   :REM*161    157Ø   :REM*162
26Ø  :REM*137     61Ø    :REM*2Ø    95Ø   :REM*143   131Ø     :REM*1    158Ø   :REM*254
27Ø  :REM*229     62Ø    :REM*5Ø    96Ø    :REM*65   132Ø    :REM*97
```

Menu, Please, by Paul Motise; April, p. 124.

```
1     :REM*199     12     :REM*74    145     :REM*71    4ØØ    :REM*69    83Ø    :REM*55
2     :REM*23Ø     2Ø     :REM*7Ø    15Ø     :REM*82    41Ø   :REM*191    85Ø   :REM*1Ø1
3     :REM*1Ø5     9Ø    :REM*148    155   :REM*115    42Ø   :REM*187    87Ø   :REM*113
4      :REM*66     95    :REM*229    16Ø     :REM*6Ø    43Ø   :REM*133   1ØØØ   :REM*2Ø7
5     :REM*15     1ØØ   :REM*226    165   :REM*119    5ØØ   :REM*2Ø7   2ØØØ   :REM*251
6    :REM*122     1Ø5   :REM*183    17Ø   :REM*23Ø    71Ø   :REM*172   3ØØØ    :REM*39
7     :REM*1Ø1    11Ø   :REM*248    175   :REM*161    72Ø   :REM*164   4ØØØ    :REM*85
8    :REM*152     12Ø    :REM*6Ø    18Ø   :REM*118    8ØØ    :REM*49   5ØØØ   :REM*129
9    :REM*191     13Ø   :REM*13Ø    2ØØ    :REM*58    81Ø    :REM*47
1Ø     :REM*4     14Ø   :REM*2Ø4    21Ø   :REM*2Ø2    82Ø   :REM*199
```

Picking the Right Sounds, by Michael and Jeffrey Goller; April, p. 50.

```
1     :REM*177     85    :REM*139     222   :REM*138     531   :REM*153     7ØØ   :REM*6Ø
2      :REM*7Ø     9Ø    :REM*248     225    :REM*51     545   :REM*157     7Ø1   :REM*185
3     :REM*245     95    :REM*231     227   :REM*177     55Ø    :REM*16     7Ø9   :REM*2Ø9
5      :REM*97     97     :REM*35     229   :REM*181     56Ø    :REM*26     71Ø    :REM*16
8     :REM*112     1ØØ   :REM*2Ø8     26Ø   :REM*237     57Ø    :REM*36     75Ø   :REM*21Ø
9     :REM*121     1Ø1   :REM*225     29Ø    :REM*57     571   :REM*255     8ØØ    :REM*37
6Ø    :REM*192     1Ø2   :REM*194     3ØØ   :REM*127     6ØØ   :REM*126     9ØØ   :REM*111
61     :REM*85     12Ø    :REM*96     3Ø1     :REM*8     6Ø1   :REM*223     9Ø1   :REM*112
62     :REM*7Ø     14Ø   :REM*116     3Ø2    :REM*23     61Ø    :REM*5Ø     9Ø2   :REM*113
63     :REM*73     15Ø   :REM*126     3Ø3    :REM*24     62Ø   :REM*122     99Ø    :REM*67
7Ø    :REM*216     151   :REM*249     3Ø4    :REM*25     63Ø   :REM*126     1ØØØ   :REM*15
71     :REM*83     2ØØ   :REM*238     4Ø3    :REM*94     64Ø    :REM*82     1Ø1Ø  :REM*149
72     :REM*4Ø     2Ø8    :REM*3Ø     5ØØ   :REM*195     65Ø   :REM*138     1Ø2Ø  :REM*1Ø5
78     :REM*54     21Ø    :REM*18     51Ø   :REM*151     66Ø   :REM*132     2ØØØ   :REM*35
81     :REM*57     214   :REM*21Ø     511   :REM*212     67Ø    :REM*9Ø     2Ø1Ø  :REM*133
82     :REM*58     216    :REM*86     514    :REM*62     671   :REM*169
83    :REM*239     218     :REM*2     52Ø   :REM*238     68Ø    :REM*9Ø
84     :REM*4      22Ø   :REM*23Ø     53Ø   :REM*234     681    :REM*25
```

Video Jukebox, by Joe Rocke; April, p. 46.

```
1     :REM*63      8Ø    :REM*196     23Ø   :REM*158     37Ø   :REM*199     51Ø    :REM*77
2     :REM*96      9Ø    :REM*122     24Ø    :REM*48     38Ø   :REM*227     52Ø   :REM*252
3    :REM*233     1ØØ   :REM*242     25Ø    :REM*68     39Ø   :REM*253     53Ø   :REM*2Ø2
4     :REM*92     11Ø    :REM*84     26Ø   :REM*171     4ØØ    :REM*85     54Ø    :REM*88
5     :REM*57     12Ø    :REM*7Ø     269    :REM*9Ø     41Ø   :REM*157     549   :REM*1Ø9
6     :REM*68     13Ø    :REM*1Ø     27Ø   :REM*133     419   :REM*218     55Ø   :REM*182
1Ø    :REM*12     14Ø   :REM*254     28Ø   :REM*133     42Ø    :REM*31     56Ø    :REM*6Ø
2Ø     :REM*Ø     15Ø    :REM*58     29Ø   :REM*2Ø3     43Ø   :REM*135     57Ø   :REM*152
29    :REM*21     16Ø    :REM*78     3ØØ   :REM*193     44Ø   :REM*131     58Ø     :REM*Ø
3Ø   :REM*198     17Ø   :REM*184     31Ø   :REM*113     45Ø   :REM*199     59Ø   :REM*2Ø2
4Ø    :REM*92     18Ø   :REM*162     32Ø   :REM*165     46Ø    :REM*47     6ØØ   :REM*22Ø
5Ø   :REM*252     19Ø   :REM*134     33Ø   :REM*119     47Ø   :REM*253     61Ø    :REM*32
6Ø   :REM*118     2ØØ   :REM*254     34Ø   :REM*177     48Ø    :REM*21
7Ø   :REM*236     21Ø    :REM*86     35Ø   :REM*173     49Ø   :REM*221
79   :REM*123     22Ø   :REM*198     36Ø    :REM*13     5ØØ    :REM*39
```


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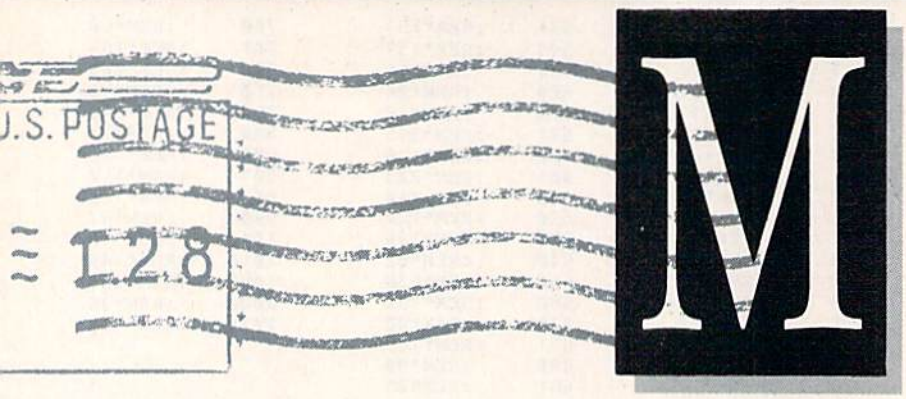


M

Where's That Software?

I'm mad at Commodore! Two years ago they announced the C-128. Three computers in one, they said, with double the memory and speed of the C-64. All that is true—they put together a fine piece of equipment.

I spent more than $800 to buy a 128 and two 1571 disk drives. I hooked the computer to my 19-inch Fisher RGB, and the demo disk looks beautiful on the big screen. I can hardly wait for the programs to start coming out. But I wait and wait and wait. . . and nothing happens. The programs never show up, and I have to run the old ones for my 64.

I tried CP/M, but the monotony of the screen color bored me. Besides, with all the new systems around, I think CP/M is obsolete.

Commodore has gotten too involved with the Amiga, and they've forgotten the 128. Those of us who believed them and purchased the 128 have been left out in the cold!

Albert H. Coya
Miami, FL

Printing a Rolodex File

Well, the polls are closed, the ballots are counted, and *RUN* wins by a landslide for having one of the most useful freeware programs around. It is, of course, Datafile by Mike Konshak.

I needed to duplicate a Rolodex file and print out three copies on one-up Rolodex cards. Datafile was perfect and DFMail only needed a minor change to print the Rolodex cards instead of labels. The cards are so much easier to read when they're printed on a printer, plus you can make as many copies as you need and even use different-size Rolodex cards.

The other bonus of using DF programs is that they'll run on the 128 as is, with no Peeks or Pokes. I even set up my file with my S'more cartridge, and was able to make a much larger file because of S'more's added memory.

Most of the addresses were local, so I set up a function key to enter "San Francisco, CA 940--". Now we only have to add the last two digits. In one afternoon we set up a 1400-record file. Another file, of about 1200 records, was all Pacifica 94044, so we didn't even enter the state or zip. Instead, I just changed DFMail to print "Pacifica 94044" on all the cards.

John Elliot
Pacifica, CA

Grover's Animals Template

I'm writing regarding the software review of Grover's Animal Adventures in the August 1986 issue of *RUN*. It was mentioned that CBS provides a template overlay for the function keys that's designed for the C-64, so it can't be used on the C-128. However, by turning the template 90 degrees, it can be placed over the 128's function keys and secured with tape.

My three-year-old has had no difficulty using the function keys this way. He only had to learn that the INST/DEL key accesses the menu, but that was no problem. Although this arrangement is not as neat as a template specifically for the 128, it does work well and the pictures on the overlay are still easily recognizable.

One thing the review failed to mention is that some of the animals that travel in water and on land cannot be placed in different, although appropriate, mediums. Ducks don't fly, crabs can't walk on the beach, and more. I find this a more significant deficiency than the lack of a template.

Eleanor M. Glavin
Hyde Park, MA

Scuba Do

Prior to leaving my home in the Bahamas recently, I ordered the *RUN* Productivity Pak and had it sent to my temporary address. I'm mainly interested in the Datafile program, for keeping records on the students in my scuba-diving courses. I haven't had an opportunity to get Datafile up and running since I've been away, but I've studied the instruction booklet and like what I see. The tie-in between DFMail and DFReport will solve many of my problems. However, I'm wondering if Datafile will handle 300 records? That's how many students I have.

Charles C. Badeau
Nassau, Bahamas

The answer is yes, if the records are a suitable size. The number of records a Datafile file can hold depends on the number of fields within each record and the number of characters in each field. One file will hold between 250 and 300 records if the records contain six or seven fields, ranging from two to 25 characters in length. Naturally, the smaller the fields, the more records per file, and the larger the fields, the fewer records per file.

Since groups of files can be saved on

one disk, and there's no limit to the number of disks you can use, there's no limit to how many files you can maintain.

Editors

The Computer Community

I've just acquired a printer on the basis of the "In Search of the Perfect Printer" articles in the May and June 1986 issues of *RUN*. I wrote to the author, Tim Walsh, of the magazine's technical staff, to ask a question before I bought it and immediately received an answer in a nice, full-page letter. I'm new to computing as a retirement hobby and belong to an active user's group here in Lakeland. I must say that I've run across the most helpful and accommodating people involved in computing that I've met in a long time.

William D. Robert
Lakeland, FL

Getting Back Issues

I recently read "In Search of the Perfect Printer, Part II," in the June 1986 issue of *RUN*. Before I purchase my own printer, I'd like to read the first part of the article. However, I can't find it anywhere! I've called numerous stores and libraries, but no one seems to know which issue of the magazine it's in. Can you help me out? I really respect your magazine's opinions, and I'm postponing my printer purchase until I can read this article.

Dana Ashberry
Albany, GA

"In Search of the Perfect Printer, Part I," appeared in the May 1986 issue of RUN. *You can order back issues of the magazine by sending $3.50, plus $1 for postage and handling, to* RUN, *Back Issue Orders, 80 Elm St., Peterborough, NH 03458. We're pleased that you find* RUN *so helpful.*

Editors

Mail-In User's Group

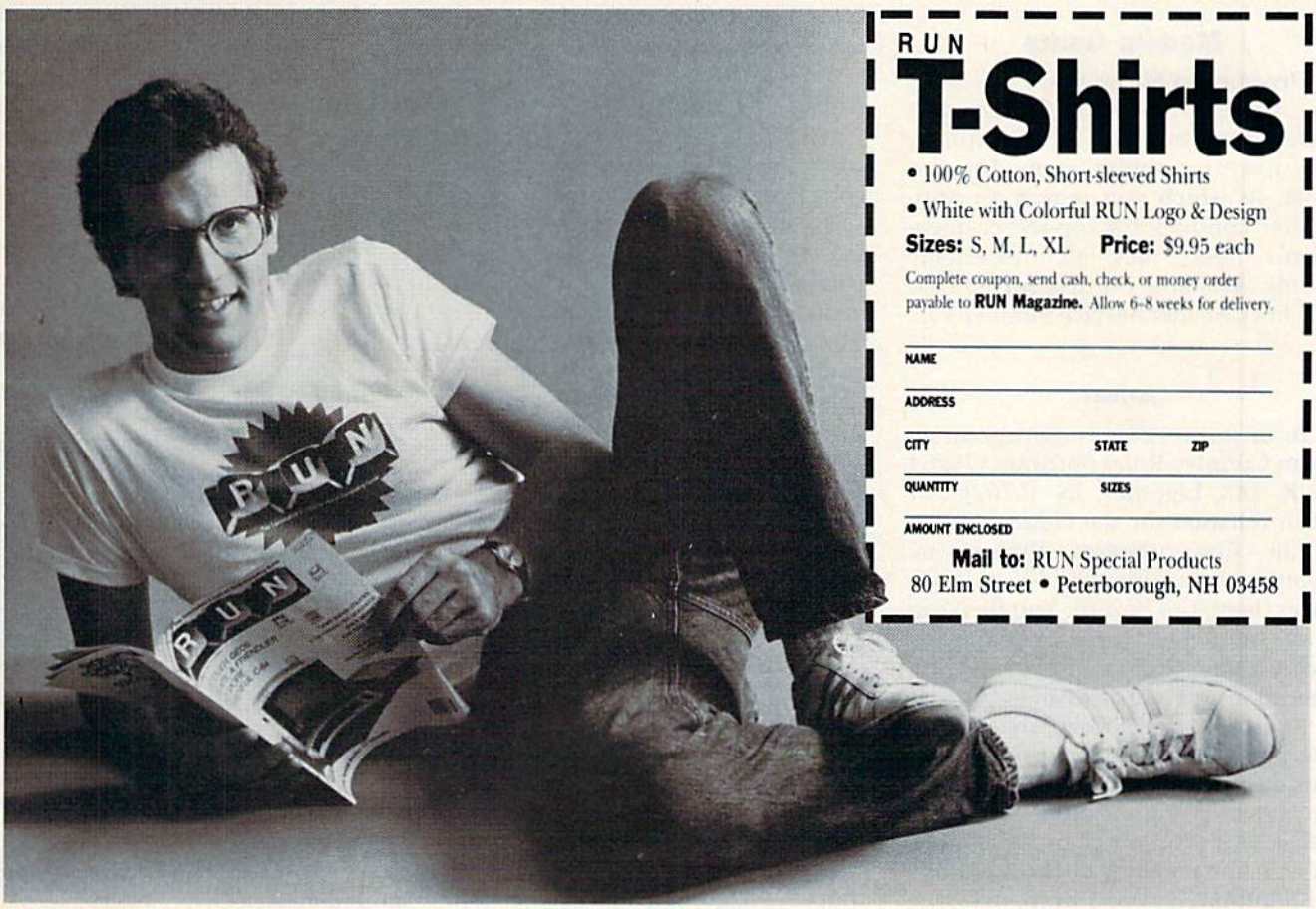
For some time now, I've been hearing about people who are searching for a user's group that operates through the mail, but I've never come across such a group. So, a friend and I have started one called MIUG (Mail-In User's Group). We don't have many members yet, but hope to get more soon. If anyone would like to join, write to me for an application. Commodore users from any state are welcome.

Charlie Ippolito
23-20 30th Drive
Astoria, NY 11102

Productivity Pak Performs

The *RUN* Productivity Pak program disk is probably the most valuable collection of software that I own (and I've collected a lot of it). I just used it in making an educational-needs assessment survey and data analysis to accurately target university extension programs for the 1200 employees at a major new industrial park here in the San Francisco Bay area. We learned a lot, and they will benefit. I find it significant that I didn't have to use an IBM-PC, and my software cost $21 instead of $210.

John W. Corr
Martinez, CA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Compiled by HAROLD R. BJORNSEN

There is nothing wrong with your television set

Do not attempt to adjust the picture. DigiTek (10415 N. Florida Ave., Suite 410, Tampa, FL 33612) has an RGBI conversion system that will add 100% true RGBI to your composite monitor to allow you full use of the C-128's color resolution and speed. The RGBI Conversion System costs $49.95.

Check Reader Service number 404.

Modem Game

Dreamrider Software (970 N. Main St., Crete, IL 60417) brings you Operation Terminal, a full-graphics, two-player modem game for the C-64, in which you search an anti-matter complex for top-secret documents before they fall into enemy hands. Available on disk for $39.95.

Check Reader Service number 405.

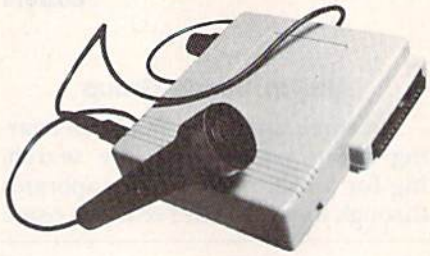
A-*ha!*

Brainstorm 128, a two-program set from Country Road Software (70284 C. R. 143, Ligonier, IN 46767), has been released for the C-128.

The first program, Brainstorm, compares your ideas and then organizes them into groups. You then can add, subdivide, rearrange and reword items. You can print your outline in a number of formats.

Brainpower, a word processor, merges with Brainstorm to load your outline, which you can then view a section at a time or all at once. Features of Brainpower include block moves and deletes, an insert mode with automatic word wrap, overtype mode, margin adjustments and headers and footers with page-numbering. Available on disk for $19.95.

Check Reader Service number 406.



Micro Arts Products' Sampler-64 lets you be creative with sound.

Speak, Sunshine, Speak!

With the Sampler-64 you can record your dog's bark, mix in your voice (or almost any other sound), add echo or reverb, and then play the resulting sound over two octaves from the computer's keyboard in any melody or non-melody you'd like. The digital sound sampler converts audible sound into a series of numbers that can be stored in computer memory, processed in various ways and then replayed via a keyboard.

Sampler-64 includes a live-effects menu with real-time echo and reverb. The Sampler-64 hardware attaches to the user port of the C-64 and comes with a microphone and cable to route the output to a TV or stereo system. It costs $89.95, from Micro Arts Products, PO Box 2522, Philadelphia, PA 19147.

Check Reader Service number 400.

OWI's WAO

OWI (1160 Mahalo Place, Compton, CA 90220) introduces WAO, the newest member of the Movit family of educational electronic robot kits. WAO teaches the fundamentals of computer programming, performs graphics and helps you develop an awareness of robotics. You can take WAO home for $99.95. OWI also sells an interface for $39.95 that connects WAO to your Commodore computer.

Check Reader Service number 402.

The Commodore Interconnection

Master Software (6 Hillery Court, Randallstown, MD 21133) releases four hardware interconnection products for your Commodore computer.

Modem Master is a four-foot extension cable for the user port of the C-64, C-128, Plus/4 and VIC-20 computers. $29.95.

Modem Master Plus includes the features of Modem Master, plus a system reset switch that resets your C-64 or VIC-20 in case of computer lockup. The switch is buffered to prevent electrical damage to your com-

OWI's WAO can teach you computer programming.

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The Great War - WWI strategy game for the C128* in 128 mode. Includes one or two player options. Armies of 17 countries. Weather, terrain, lines of supply, etc. affect the outcome. C128* disk only - $29.95

BASICally SIMPLE 128 - How to use all C128* Basic 7.0 commands, functions and operators in Basic programs. C128* disk only - $19.95
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Datafiler 128 - Database program for the C128* in 128 mode. Disk - $24.95

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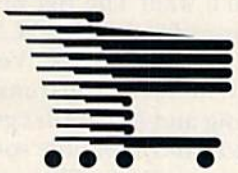

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puter, and programs are included to recover the Basic program that was in memory at the time the lockup occurred. $34.95.

Y-Not?, a six-foot Y cable for the six-pin serial port of your Commodore computer, operates two printers at once or allows greater flexibility in the placement of your disk drive and printer. $15.

The 80 Mono Cable produces an 80-column monochrome display from the C-128 in 80-column mode on any monochrome or composite color monitor. $9.

Check Reader Service number 409.

Hi-tech Greetings

Hi Tech Expressions (2699 South Bayshore Drive, Suite 1000A, Coconut Grove, FL 33133) introduces four programs for the C-64 that produce party items and greeting cards.

PartyWare is a complete party-planning and design package that prints out banners, party hats, invitations, place mats, place cards, prizes, a party-planning checklist, party-game ideas and thank-you notes for guests. Personalized invitations, notes and greeting cards can be printed using the selection of graphics, borders and salutations available. You can also create an animated note on a disk and send it to a friend. Available on two disks for $14.95.

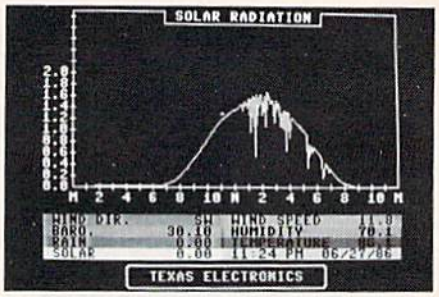
HeartWare is a personal computer-based card maker. It has an animated love story in a nature setting with an accompanying verse that can be personalized with your message and sent to a friend. $9.95.

CardWare is an animated birthday greeting disk and all-occasion card maker, available for $9.95. WareWithAll is a supply kit with colorfully designed paper, stickers, markers, envelopes, disk labels and a disk; available for $14.95.

Check Reader Service number 403.

Attention: Willard Scott

Why wait for the National Weather Service's report, which may be hours old, when, for $495 you can have the CWS-128 program to convert your C-128 into a weather station? (In order to use it, however, you must also have Texas Electronics' meteorological sensors.) The program displays the current wind direction and speed, barometric pressure, inches of rain, humidity, temperature and solar radiation levels. Six display modes cycle through various screens to give parameter highs, lows, averages, accumulations and high-resolution time-domain plots. Your personal weather station is available on disk from Texas Electronics, PO Box 7225, Inwood Station, Dallas, TX 75209.



Texas Electronics' CWS 128-1.0 weather station.

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Your spaceship, whose cargo is to be used to nullify the deadly effects of a power-transfusion waste product headed towards Earth, is forced to land on the planetoid Oo-Topos, where alien space pirates imprison you. You must escape and recover your ship with its important cargo before time runs out. Oo-Topos is available on disk for the C-64 for $17.95. Polarware, PO Box 311, Geneva, IL 60134.

Check Reader Service number 407.

Big Blue C-128

If you use an IBM or compatible personal computer at work and a C-128 and 1571 disk drive at home, then you'll want The Big Blue Reader program from S.O.G.W.A.P. Software (611 Boccaccio Ave., Venice, CA 90291). With it, you can transfer word processing and ASCII files generated on most IBM-compatible software to Commodore DOS files, and vice versa. Available on disk for $29.95.

Check Reader Service number 408.

Disk Nibbler V3.0

An update of the original Disk Nibbler for the C-64 has been announced by Ultrabyte (PO Box 789, LaCanada, CA 91011) that makes backups of 99% of recently released commercial programs. Owners of earlier versions of the Disk Nibbler may order the latest version (V3.0) for $20, and others may purchase it for $39.95, plus $4 shipping.

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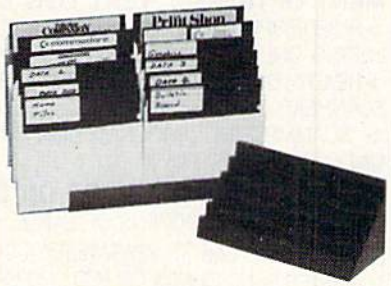

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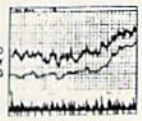

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Learn to Walk Before You RUN

We receive many letters from new Commodore owners who want to learn the first steps in using their computers. For these first-time users, we present the following step-by-step list of things that all beginners should be aware of as they start typing in programs.

1. Before you can use a fresh disk, you have to format it. First turn on your disk drive, then insert the disk, close the latch and type:

```
OPEN15,8,15 <Press Return>
PRINT#15,"N0:NAME,##" <Press Return>
```

The ## is a two-character identification number that can be any combination of letters and/or digits. "NAME" can be any title for your disk that you choose, but it must not exceed 16 characters. Wait for a few minutes while the disk spins inside the drive, being formatted. When the disk stops spinning, type:

```
CLOSE15 <Press Return>
```

C-128 owners can shorten this procedure by simply typing:

```
HEADER "NAME,##" <Press Return>
```

Caution: The formatting process erases all material already on the disk, so if you're formatting a used disk, make sure it doesn't contain any programs you want to save. See item 7, below, on reading the disk directory.

2. As a beginner, you should start entering short Basic programs. Avoid machine language listings and very lengthy Basic programs until you get the hang of what you're doing. We have a checksum program (Perfect Typist) which actually proofreads your typing and tells you when you make a mistake. You should type in Perfect Typist before you enter any programs. See directions below.

3. Remember to press the return key after each programming line you type in.

4. As you are typing in a program, you are likely to make typographical errors. To check what you have typed in, you'll need to list your program's lines on the screen. You can specify the exact lines that you want to see. Typing LIST 10–50 will list lines 10 through 50. LIST 20 will list only line 20. If you see an error in one of your listed lines, you can fix it by using the INST/DEL key and retyping the incorrect section of the line. Always press the return key after you have fixed a line.

5. Be sure to save what you have typed in before turning off your computer. To save any partial or complete Basic program listing to your disk, type:

```
SAVE "NAME",8 <Press Return>
```

C-128 owners can press F5, type in the program name, and press the return key.

Note: As you save subsequent versions of the same program, you need to make a slight change in the program name each time. You might simply add version numbers to the end of the program name (PROGRAM.1, PROGRAM.2, etc.).

6. While working on a program, you may develop several versions before you're satisfied that you have it in final form. After you *do* achieve that final version, you

Circle 202 on Reader Service card.

might want to go back and erase the old, incomplete versions from your disk. Erasing unwanted programs is called scratching. (Be sure not to erase your final version!) To scratch a program, type:

```
OPEN15,8,15 <Press Return>
PRINT#15,"S0:prog.name" <Press Return and wait a few seconds>
CLOSE15 <Press Return>
```

7. After you have saved several programs to your disk, you will need to see their names so that you can load the one you want. To get the complete list (the disk directory) of all the program names on your disk, type:

```
LOAD "$",8 <Press Return>
```

Then type LIST to actually see the directory. C-128 owners simply press F3.

8. When you know what program you want to load into your computer, type:

```
LOAD "NAME",8 <Press Return>
```

C-128 owners can just press F2, type in the program name, and press the return key.

9. After you have loaded a program, type RUN to actually use the program.

How to Type Listings From *RUN*

To simplify your typing of *RUN*'s C-64 and C-128 program listings, we include checksum numbers. These numbers follow a REM statement at the end of each line (e.g., :REM*123). These checksum numbers necessitate your using *RUN*'s Perfect Typist programs, listed below. Use 64 Perfect Typist for C-64 programs and 128 Perfect Typist for 128 Mode programs on the C-128.

Type in 64 Perfect Typist (Listing 1) or 128 Perfect Typist (Listing 2) and save it to either tape or disk before running. When you want to type in a 64- or a 128-mode program, first load and run the appropriate Perfect Typist listing. Two SYS numbers will be displayed on your screen. Jot these down and keep them handy. They are the SYS numbers that you type in for deactivating and reactivating the checksum program.

After Perfect Typist has been loaded and run, start typing in the program listing from *RUN* as you normally do. The only difference is that now, after you press the return key to log in each line, a 1-, 2- or 3-digit number will appear below the line on the left margin. This is the checksum number, ranging from 0 to 255.

If this number matches the checksum number printed in the listing after the :REM*, then you know you have typed that line correctly. Then you type the next program line right over the previous line's checksum value. If the checksum numbers do not agree, analyze your line on screen for any typographic errors or omissions. Make the needed changes and press the return key again to log in those changes. A new checksum number will appear in place of the old one. Compare this to the magazine's number and then proceed to the next line.

When you've finished typing in your program, disable the Perfect Typist by typing in the appropriate SYS number for either 64 or 128 mode, and press the return key. Now you can save your program as usual, to disk or tape. (Before you attempt to run your new program, turn

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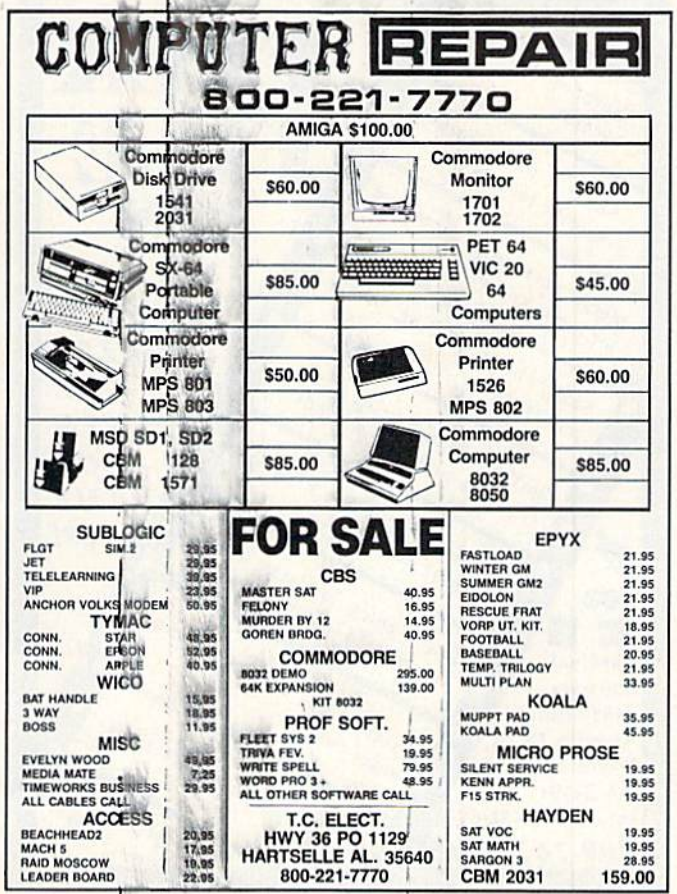
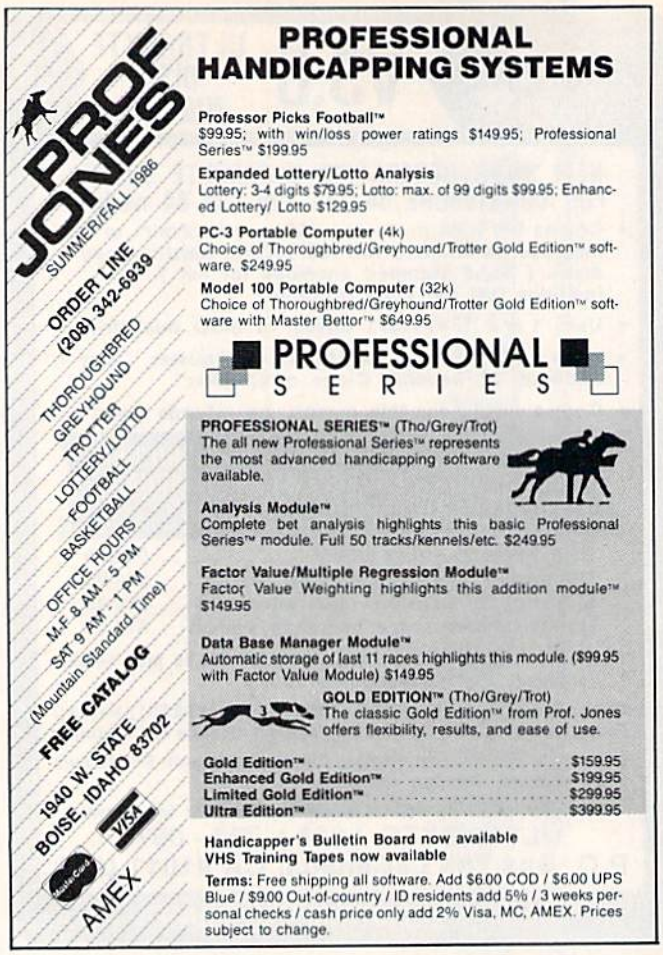


Circle 75 on Reader Service card.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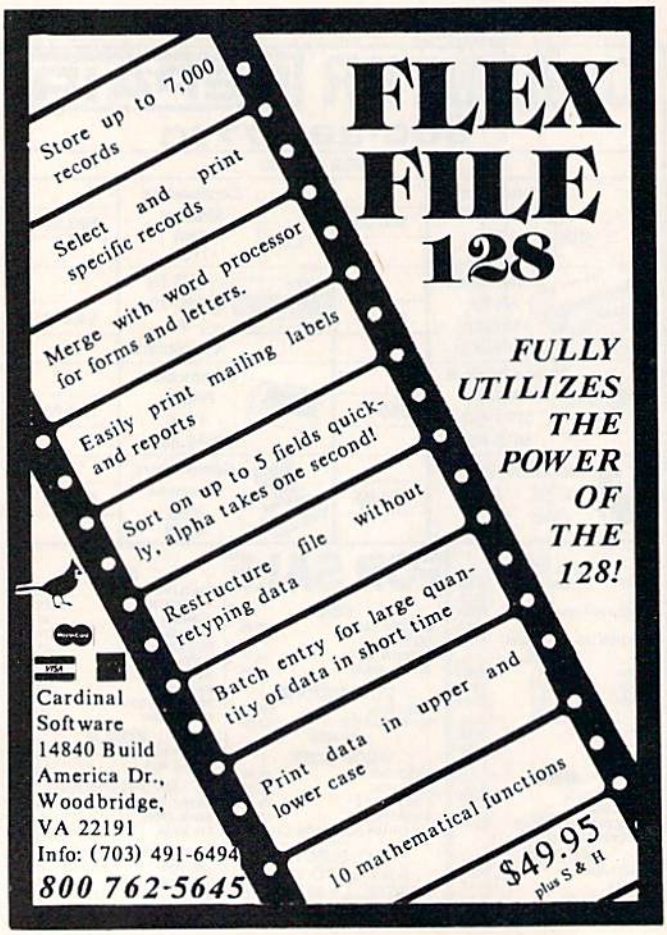
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your computer off and back on to completely clear out the Perfect Typist program.)

You may save an incomplete program any time and continue it later. You will have to reload and run the Perfect Typist program, then load the incompleted program that you were working on, list it, and continue where you left off.

The 128 Perfect Typist will work in either 40 or 80 columns. Also, it lets you use the C-128's automatic line-numbering. If Auto is on, the checksum will be printed below the line you just entered, and the C-128 will place the next line number below the checksum.

All listings in *RUN* have been translated so that the graphics and control characters are designated as understandable key combinations. When you see instructions inside curly brackets, such as {SHIFT L}, you should hold down the shift key and press the L key. What you see on your screen will look quite different from what is designated inside the brackets. Another example is {22 SPACEs}, which instructs you to press the space bar 22 times.

Listing 1. *64 Perfect Typist program.*

```
1 REM 64 PERFECT TYPIST
2 REM
3 REM WRITTEN BY:
4 REM JAMES E. BORDEN
5 REM 641 ADAMS ROAD
6 REM CARLISLE, PA 17013
7 REM
10 POKE56,PEEK(56)-1:POKE52,PEEK(56):CLR
20 PG=PEEK(56):ML=PG*256+60
30 FORX=ML TO ML+154:READD:T=T+D:POKEX,D:NE
   XT
40 IFT<>16251 THEN PRINT"ERROR IN DATA...":
   END
60 POKEML+4,PG:POKE ML+10,PG:POKE ML+16,PG
70 POKE ML+20,PG:POKE ML+32,PG:POKE ML+38,P
   G
80 POKE ML+141,PG
89 PRINT"{SHFT CLR}{CRSR RT}**************
   ************************"
90 SYS ML:PRINT "{CRSR RT}** 64 PERFECT TYP
   IST IS NOW ACTIVE{2 SPACEs}**"
100 PRINT "{CRSR RT}** SYS"ML"=ON{5 SPACEs}
    SYS"ML+30"=OFF **"
101 PRINT"{CRSR RT}**********************
    **************":NEW
110 DATA 173,005,003,201,003,208,001,096
120 DATA 141,105,003,173,004,003,141,104
130 DATA 003,162,103,160,003,142,004,003
140 DATA 140,005,003,096,234,234,173,104
150 DATA 003,141,004,003,173,105,003,141
160 DATA 005,003,096,032,124,165,132,011
170 DATA 162,000,142,240,003,142,241,003
180 DATA 189,000,002,240,051,201,032,208
190 DATA 004,164,212,240,040,201,034,208
200 DATA 008,072,165,212,073,001,133,212
210 DATA 104,072,238,241,003,173,241,003
220 DATA 041,007,168,104,024,072,024,104
230 DATA 016,001,056,042,136,016,246,109
240 DATA 240,003,141,240,003,232,208,200
250 DATA 173,240,003,024,101,020,024,101
260 DATA 021,141,240,003,169,042,032,210
270 DATA 255,169,000,174,240,003,032,205
280 DATA 189,162,003,189,211,003,032,210
290 DATA 255,202,016,247,164,011,096,145
300 DATA 013,032,032
```


Circle 193 on Reader Service card.

Listing 2. *128 Perfect Typist program.*

```
1 REM 40/80 COL 128 MODE PERFECT TYPIST
2 REM
3 REM WRITTEN BY:
4 REM JAMES E. BORDEN
5 REM 641 ADAMS ROAD
6 REM CARLISLE, PA 17013
7 REM
10 FORX=5120TO5379:READD:T=T+D:POKEX,D:NEXT
20 IFT<>28312 THENPRINT"{2 CRSR DNs}ERROR I
   N DATA...":END
25 A$="":IFPEEK(215)=128THENA$="{20 SPACEs}
   "
30 PRINT"{SHFT CLR}"A$"{CRSR RT}**********
   **************************"
40 PRINTA$"{CRSR RT}** 128 PERFECT TYPIST I
   S NOW ACTIVE **"
50 PRINTA$"{CRSR RT}**{2 SPACEs}SYS 5120=ON
   {7 SPACEs}SYS 5150=OFF{2 SPACEs}**"
60 PRINTA$"{CRSR RT}**********************
   ***************":SYS5120:NEW
5120 DATA 173,005,003,201,020,208,001,096,1
     41,045
5130 DATA 020,173,004,003,141,044,020,162,0
     43,160
5140 DATA 020,142,004,003,140,005,003,096,2
     34,234
5150 DATA 173,044,020,141,004,003,173,045,0
     20,141
5160 DATA 005,003,096,032,013,067,140,255,0
     19,162
5170 DATA 000,142,252,019,142,253,019,142,2
     54,019
5180 DATA 189,000,002,201,032,240,008,201,0
     48,144
5190 DATA 007,201,058,176,003,232,208,238,1
     89,000
5200 DATA 002,240,054,201,032,208,005,172,2
     54,019
5210 DATA 240,042,201,034,208,010,072,173,2
     54,019
5220 DATA 073,001,141,254,019,104,072,238,2
     53,019
5230 DATA 173,253,019,041,007,168,104,024,0
     72,024
5240 DATA 104,016,001,056,042,136,016,246,1
     09,252
5250 DATA 019,141,252,019,232,208,197,173,2
     52,019
5260 DATA 024,101,022,024,101,023,141,252,0
     19,169
5270 DATA 042,032,241,020,032,188,020,160,0
     02,185
5280 DATA 185,020,032,241,020,136,016,247,1
     65,116
5290 DATA 208,009,165,117,208,005,169,145,0
     32,241
5300 DATA 020,172,255,019,096,013,032,032,1
     62,000
5310 DATA 173,252,019,232,056,233,100,176,2
     50,105
5320 DATA 100,202,240,003,032,232,020,201,0
     10,176
5330 DATA 005,205,252,019,240,015,162,000,2
     32,056
5340 DATA 233,010,016,250,024,105,010,202,0
     32,232
5350 DATA 020,170,072,138,009,048,032,241,0
     20,104
5360 DATA 096,170,173,000,255,072,169,000,1
     41,000
5370 DATA 255,138,032,210,255,104,141,000,2
     55,096 ■
```


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RUN AMOK

Item: The Quick Merge program as published in the June 1986 issue (p. 84) does not merge programs as intended when menu item 3 (MERGE FROM DISK) is selected. Thanks to Gregory Houston, of Clanton, AL, and his uncle, Walter Mewborn, of Memphis, TN, for the following changes to fix the problem:

In both line 63964 and line 63965, change 63960 to 63958.

Item: In the July 1986 Magic column, trick $30C (p. 79) confuses the If/Then/Goto loops and the For/Next loops. The trick should read:

The popular Blitz! compiler executes For/Next loops much more quickly than If/Then statements. So you can speed up your Blitz!ed programs by changing lines like

```
100 J=0
105 J=J+1
110 Other program lines
120 IF J<10 THEN 105
```

to lines like

```
100 FOR J=1 TO 10
110 Other program lines
120 NEXT J
```

Item: Magic trick $319, "1571 disk drive magic" (August 1986, pp. 10 and 76), contains an error in the second command. The section of that command between the quotation marks should read: U0>M0. Thanks to Ted Steppe, of Laguna Hills, CA, for spotting this.

Item: In the Disk Keeper program (August 1986, p. 34), the following two lines will fix a problem that occurs when you're printing labels from odd-numbered directories:

```
3180 PRINT#4:GOSUB3600:GOSUB3500:GOSUB3600:
     J=INT(NF/2)
3185 IF INT(NF/2)<>NF/2THENJ=J+1
```

If you have a very old model 1541 disk drive, you may have encountered a disk error when the program read a directory that had a zero in it. If so, the following modifications should help:

```
6060 TT=T:SS=S:PRINT#15,"U1:3,0";T;S:PRINT#15,
     "B-P:3,0"
6130 PRINT#15,"B-P:3";K*32+30:GET#3,X$:B=
     ASC(X$+CHR$(0)):GET#3,X$
6210 NEXTK:IFT=18 AND S>0 AND S<19 THEN 6060
```

Item: There is an error in the Elmer the Turtle program ("Turtle-Tutor for Tykes," September 1986, p. 46). Line 1450 should end with THEN 1370, instead of THEN 1400. This is part of an error-trapping routine that prevents inputting graphics characters.

New Bulletin Board Number

The *RUN* technical and editorial offices changed locations last winter, necessitating new phone lines and a new phone number for the RUNning Board. We invite you to give us a call at the new number, 603-924-9704, to find out the latest information about *RUN* magazine and the Commodore industry.

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188	ActionSoft Corp.	23, 24, 25
*	Aprotek	99
301	Basix Softworx	38
*	Batteries Included	CII
134	Berkeley Softworks	28, 29
111	Berkeley Softworks	30, 31
16	Bodylog, Inc.	52, 53
*	C.O.M.B	117
193	Cardinal Software	140
81	Central Point Software, Inc.	38
32	Chipmunk Software	121
251	Compumed	141
64	Compuserve	72, 73
*	Computer Centers of America	97
274	Computer Friends	123
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300	Covox, Inc.	86
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157	db Software	92
80	Digital Solutions, Inc.	CIV
*	DiskAssist	137
18	DreamRider Software	1
3	Electronic Arts	7
156	Emerald Components	70
29	Enlightenment Inc.	101
12	Epyx	9
104	Firebird Software	41
99	Firebird Software	51
144	Free Spirit Software	135
*	Future Music	137
*	GE Information Services	33
44	GSR Software	125
9	H&E Computronics	71
67	Illustrated Images	65
*	Intelligent I/O, Inc.	137
202	Jason-Ranheim	138
145	KFS Software, Inc.	141
337	Kaltek Labs	138
126	Ketek	67
13	Kledzik Company	135
*	Lyco Computer	94, 95
189	Megasoft	75
47	Microcomputer Games	27
207	Micro Computer Services	131
38	MicroCube Corp.	100
91	Microlog Corp.	126
172	Micro WDI, Inc.	125
68	Microprose Software	44, 45
*	Mindscape	2, 3
60	Omnitronix	135
93	Professional Software, Inc.	47
74	Prof. Jones	140
223	Pro-Tech-Tronics	88, 89
15	Protecto Enterprize	77, 78, 79
220	Quinsept	137
215	RJ Softshop	142
	RUN	
	ReRUN Library Ad	32
	ReRUN Subscriptions	80
	RUN Gift Subscription	64
	ReRUN Special Ad	96
	RUN Special Issue	91
	RUN T-Shirts	133
	RUN Class Ads	143
82	SM Software	127
42	SOTA Computing	142
*	S&S Wholesalers	87
90	Skyles Electronic Works	76
254	Software Discounts of America	107
25	Strategic Simulations, Inc.	39
87	Sublogic Corp	21
40	Sublogic Corp	83
26	Sublogic Corp	49
113	Sublogic Corp	69
122	Sunrise Software	135
75	TC Electronics	139
155	Tenex Computer Express	93
168	Timeworks, Inc.	11
2	Timeworks, Inc.	59
146	Timeworks, Inc.	21
209	Tussey Computer Products	16, 17, 18, 19
132	Ultrabyte	139
80	VG Data Shack	6
121	Value-Soft	81
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86	Wenger, Corp.	50
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151	Wilanta Arts	137
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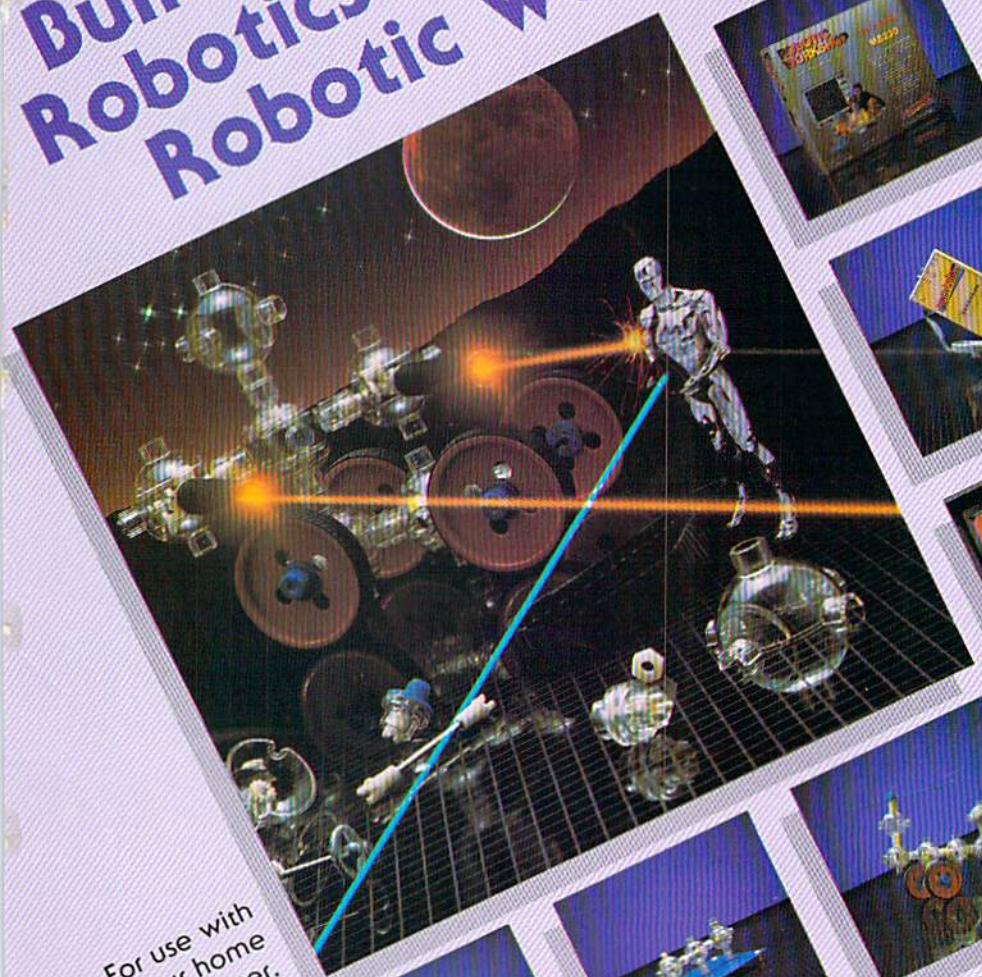

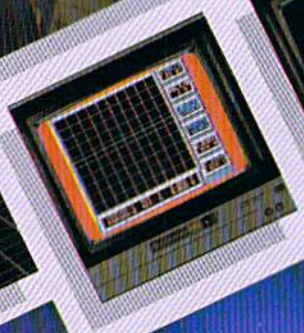

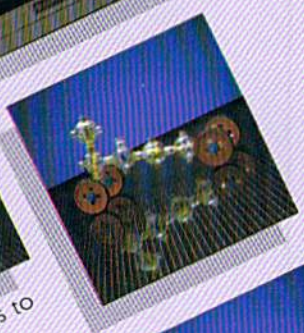

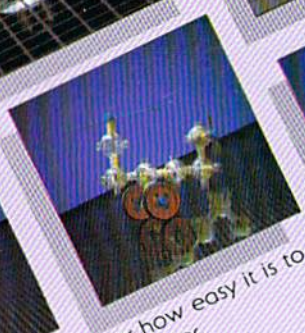

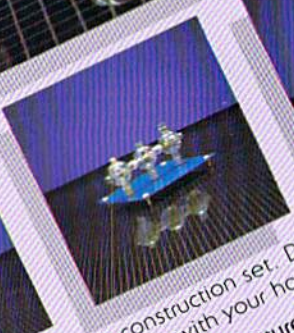

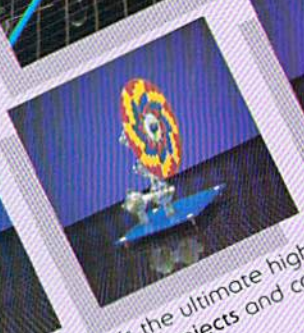

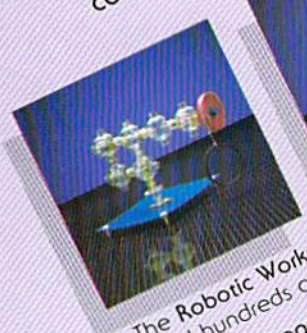

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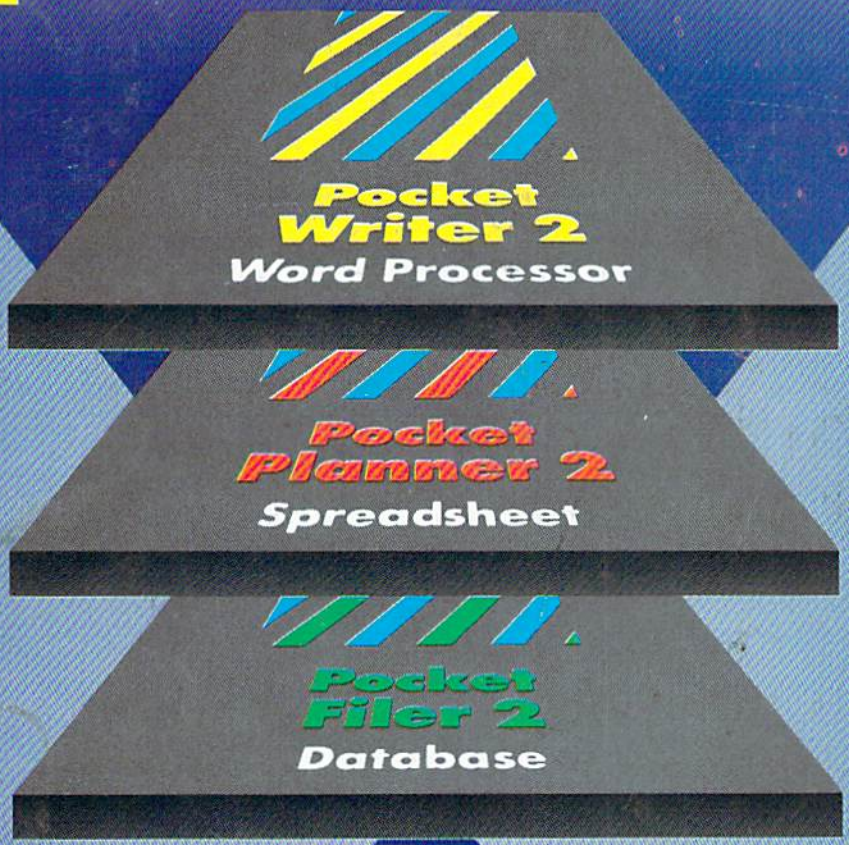

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